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RESEARCHES

INTO THE

CAUSES, NATURE, AND TREATMENT

OF

THE MORE PREVALENT

DISEASES OF INDIA,

AND OF

WARM CLIMATES GENERALLY.

BY

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PREFACE.

DURING the greater part of thirty-seven years' practice I have had the good fortune of enjoying unusual opportunities of acquiring professional experience in various parts of India,—under all circumstances and situations of intertropical service,—in charge of large general hospitals at fixed stations,—in field hospitals on actual service,—in regimental hospitals, moving over various countries, and through different climates,—amongst Europeans, as well as natives,—and among men, women, and children,—in all classes of the community, public and private. I have taken extended notes of the symptoms, progress, and treatment of all diseases which have come under my care, sedulously watched their progress throughout, comparing the symptoms while living, with the appearances after death, and noticing any omission that appeared to have been made in course of treatment, with a view of correcting it on any future occasion. I have followed this system throughout my long period of service, and it has given me facilities of marking differences in cases, and detecting symptoms which would otherwise have been obscure. Having found this system so extremely valuable to me in my practice, I earnestly recommend its adoption to the profession in general; while I feel it a duty on my part to submit the result of my experience and observations, not only to my professional brethren, but to the service in general in which I have passed the best part of my life, and for the credit and welfare of which I must ever feel the warmest interest.

In India the medical practitioner has every possible opportunity of investigating disease by *post mortem* examinations,

and of connecting the symptoms and treatment with those morbid changes which take place in its course; but the difficulty of describing morbid structures and the impossibility of preserving the natural appearances in the way morbid preparations are usually made, led me to cause drawings to be executed of the more interesting and remarkable changes produced upon the internal organs by the diseases I was called upon to treat. Circumstances placed in my power the means of accomplishing this object, and I trust that I have fully availed myself of them. *Post mortem* examinations necessarily take place in warm climates soon after death, and before the capillary circulation in the internal organs has undergone that change which is experienced after a few hours, or before the blood has returned from the minute arteries into the venous trunks. Thus, the warmth of the climate has indirectly enabled me to give a more correct delineation of the appearances of diseased structure than could otherwise have been obtained; and the drawings have all been made under my own eye and coloured from the recent subject. The knowledge thus unfolded induced me to follow up the indications to which it pointed; and as an early examination of the subject of disease after death appeared necessary to accurate ideas, as to the more minute changes and finer shades of disorder impressed upon the different internal viscera during life, it was never neglected when it could be practised with propriety.

The previous edition was published in 1828, in two large quarto volumes, accompanied by 40 plates representing the drawings above noticed, accurately coloured, and exhibiting all the morbid appearances common to the diseases of India. The great expense necessarily attendant upon this work was liberally defrayed by the Honourable the Court of Directors of the East India Company; and my highest ambition, and my most anxious hope has been, that this work might prove useful to their service in India, and to intertropical practitioners generally, and thus be deserving of the high patronage and liberality of the Court.

The work is now attached (as a regimental record) to every regiment in India, and I have reason to believe that it has been useful to the service;—but the expensive form in which it has been put forth, has, I fear, in a great measure, frustrated my intentions, and rendered the work less generally useful than I had hoped to have made it. Several of my professional friends, both in India and in this country, have suggested to me, that a condensed edition would be more acceptable to the profession, and more likely to be useful to the public; I have, therefore, in the retirement from the active duties of my profession, been induced to revise the whole work in the most careful manner; to omit the general descriptions of cases, and also the physiological views which may be found in the writings of others, and a knowledge of which it is not unreasonable to presume is already possessed by all medical officers in India. By these means the work has been greatly reduced in size, rendered portable, and placed within the reach of every practitioner. I can safely state that whilst every redundancy of expression has been struck out, and every superfluity of diction curtailed, no single fact has been omitted, and I sincerely hope that in offering to the public a mass of practical facts—the result of long, varied, and extensive observation, I shall, in presenting this edition to the public, be rendering a service to the medical profession in general. The morbid appearances have been as faithfully described as possible in the absence of the plates, and they can at any time be verified by reference to the previous edition, which, as already stated, is with every European and native regiment in India, as well as in all garrisons—and in many civil stations. My object has been to render the work practically useful—to give to the medical officers of India a manual, as it were, of the diseases which he may have to combat in the course of his practice, and to point out to him the various forms and varieties under which they appear, and the mode of treatment which has been found to be attended with the greatest success.

In the previous edition I endeavoured to give to the reader

a general view of the climate and diseases of the Bengal and Bombay Presidencies, derived chiefly from the records furnished by the Honourable East India Company. My object in entering upon this branch of the subject, upon which I did not entertain any personal knowledge, was principally to excite some of the many well qualified individuals belonging to the medical service of these Presidencies; to direct their attention to it, and to communicate to the public the results of their experience in their own particular localities. No one could feel more sensibly than myself, that ample talent for the inquiry existed among the medical officers of those Presidencies; but the profession and the exercise of talent are distinct from each other, and I ventured zealously to call for the latter upon a subject of vital importance. The extensive field of observation in which it has fallen to my lot to be actively engaged, may perhaps be considered as a justification of my efforts to draw attention to the climate and health of the troops in other presidencies than that to which I was attached; more especially as there was no work at that time of recent date which treated specifically of the diseases peculiar to those presidencies. My object was to promote to the utmost extent of my power the general good of the public service, without the slightest wish to interfere with the duties or privileges of others. Nor have my anticipations on this head failed; for since the publication of my work in 1828, a member of the Bengal Medical Service has put forth his "Observations on the Diseases peculiar to Bengal."

As more extended views of physiological and medical science have been developed, the profession in India, as elsewhere, has been more on the alert, and manifested due eagerness to contribute to the general stock of information; and from the spirit of emulation now excited, we may reasonably anticipate a fruitful harvest in relation to all subjects in connexion with the Diseases of India, as they appear in the several presidencies, from the highly talented professional men who now form the very effective medical staff of the India Medical Service. Whilst, however, I have in this edition been induced to omit all

Medico-Topographical statements relative to the Bengal and Bombay Presidencies, I have been careful to extend my remarks upon that of Madras; pointing out the various stations in the different divisions of the army, and giving a short summary of the climate, the peculiar localities, and the diseases most prevalent in each. I could have entered more largely into this subject, but my great object has been to reduce and render the work as portable as possible. Whilst, however, I have kept this desirable object in view, I hope I have not lost sight of such facts as will be useful to medical officers on their arrival in India, and prove a faithful guide in their future service. It is only by the united exertions of the profession in different parts of the world, that medical knowledge can be really advanced; and it would be vain in any one man to attempt more than his own experience and observation authorised. To the public services the members of the profession have a right to look for practical facts which shall enable them to extend their knowledge—shall dispel the obscurity that too frequently involves them in difficulties, and open to them distinct and correct views of disease; but in the investigation of those facts the mind should not be warped by prejudice, or cramped in its exertions by trifling distinctions, and the recognition of forms which are of no essential value in practice. Intimate and enlarged ideas of every subject connected with medicine should be entertained; what is essential and important should be distinguished from what is fortuitous and trivial, and the science cultivated as first amongst the highest departments of human knowledge—as being the application of numerous branches of study to one great end,—the alleviation and removal of human suffering, and the prolongation of human life. In this point of view there is not a nobler study,—there certainly is none which displays a more ample field for the exercise and improvement of the powers of mind.

The want of precise information as to the treatment of disease on first arrival in India, has been felt by every person who has visited that country, and by none more sensibly than

myself. The rapidity with which morbid actions run their course in warm countries calls for the most decided treatment, —there is no time in the acute disorders of those climates for speculation,—they must be decidedly met, to be successfully combated. The boldness with which many of the diseases detailed in this work have been recommended to be treated, may surprise the practitioner in more temperate countries, where disease is much slower in its progress than it is in warm climates. But in India, if disease be not checked at its commencement, and before it has established itself in the structure of vital organs, either the patient is lost, or that organic derangement is produced which makes him a burden to himself, and useless to the public service or to society. Decision in the treatment of intertropical maladies, however, in order to be beneficial, or even to be devoid of mischief, must be the result of precise and accurate views of their nature and causes: these are chiefly to be acquired by close and attentive observation at the bed-side of the patient. The nature and extent of the measures to be pursued, and the application of them to the various periods or stages of disease, and to the peculiarities of habit and constitution, must depend upon the intelligence, discrimination, and tact, of the practitioner, who should know when to confide in the operations of nature, and when to be decided in the employment of the resources of art: and as this is one of the first features in the character of a good and enlightened physician, so the acquisition of it should be the object of every medical man's ambition.

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PRACTICAL RESEARCHES

INTO THE

DISEASES OF WARM CLIMATES.

BOOK I.

PRELIMINARY OBSERVATIONS.

The diseases most prevalent in warm climates have been treated of by authors whose opportunities of observation have been various, with regard to the particular sources of their experience, the circumstances peculiar to the patients who came before them, and the length of their practice. Of all these authors, there are few who have not contributed materially to our knowledge of the nature and treatment of these diseases. Some, however, have written more confidently than the nature of their experience warranted, conceiving that what had occurred to their observation ought to have been noticed by others, and that the results which they obtained should equally have been remarked by those who preceded, and be confirmed by such as may succeed them. But whilst some conceived they were instructing the rising profession from the purest sources of information, their inexperienced readers seldom stopped to inquire into the extent of that information, or the peculiar circumstances under which it was obtained; they seldom considered, that although disease has certain characters to-day, it may have very different ones at another time, according as the nature of its causes may vary, and as the circumstances more immediately related to the patient may change.

Practitioners whose experience of the diseases of warm climates has been limited to those who have recently arrived from a cold country, possessed of a phlogistic diathesis and plethoric habit of

body, heightened by living on salted animal food and a liberal use of spirits, perceiving vascular action increased, and even tumultuous, most properly deplete their patients, and find their practice successful. Elated with success, and without considering that the character of the disease and the issue of the practice are the result of the particular circumstances of the patients, they become prone to contend that the fevers and diseases of the country are of the same nature with those which they have observed in the narrow sphere of their experience, and are to be cured by the same means which they have practised.

Other practitioners have observed the diseases of intertropical countries under other or almost opposite circumstances, and owing to those circumstances, in connexion with an essential difference in the nature of the causes productive of these diseases, have been led to employ a method of cure very different from that now alluded to. They write on the diseases of warm climates, and, as they conceive, from experience. As an account merely of what they had themselves seen in the particular field in which they were labourers, their observations would have been valuable; but when they generalise from the very limited data they have obtained, and assert that what was true as respects that which came before themselves, under particular influences and circumstances, must be true also of all that has been observed, or will be observed in future,—they may influence the inexperienced, but they will never command the assent of the practitioner, who, taking nature as his guide, follows the dictates of his own judgment, and endeavours to found his views of diseased actions, whether observed between the tropics or in the temperate zones, upon the nature of the causes, the vicissitudes of season, climate, endemic and epidemic influences, and still more particularly upon the circumstances which are proper to the individual.

Amongst the various works which have already appeared, there are very few which have proceeded from authors whose experience in warm climates has been diversified to that extent which could have been desired. They who have seen the diseases of those climates, only as they appear in ships of war or merchant ships, either at Diamond Harbour, or Batavia, or Vera Cruz, or Kingston, during a few weeks' or months' stay at these ports, may be very able and safe guides as respects the diseases which occur in ships recently arrived or stationed at these places, at particular seasons of the year; but they can never be considered authorities as to the nature and treatment of the diseases of the country, as

they occur under every variety of cause, influence, and circumstance by which they are modified. Nor can they be always implicitly trusted as regards the maladies of the class of individuals to which their practice has been limited; for much will depend, as to both the nature and treatment of the diseases, upon the length of time ships have been navigating within the tropics, the country from which the crew has been obtained, the time which has elapsed since they left a cold country, the manner in which they have been fed, the quantity of spirits they have been allowed, whether they have been before in a warm climate, whether their stay in it was long or short, or at a remote or recent period, and whether the susceptibility of their frames and the rigidity of their fibres have been subdued by previous attacks of what is usually called seasoning fevers.

Nor can, on the other hand, army physicians or surgeons, whose observations have been limited to a particular country, district, or situation, and to a class of men very distinct in their habits and occupations from the community generally, be received as competent authorities upon a subject which has reference to all classes of men,—to natives as well as Europeans,—and to those amongst the latter who have passed the greater part of their lives in a warm country, equally with those who have recently arrived in it. When, however, their opportunities are extensive and diversified, there is no class of practitioners who have more ample means of advancing our knowledge of diseases: they have complete control over their patients; and new remedies and improved modes of treatment may be employed, and *post mortem* examinations may always be made by them without restriction.

Unfortunately for the state of medical science, as regards intertropical diseases, written opinions respecting them have been too often furnished by those to whom many of the above observations very closely apply. And still more unfortunately for the young practitioner, upon his arrival in warm climates, instead of endeavouring closely to analyse the symptoms of the disorders which come before him, and to judge impartially respecting them, assisted by the lights which science has afforded him, his mind is biassed by the opinions promulgated by those whose sources of experience are of the description already noticed, and he surrenders his judgment to their direction. The unreservedness with which their pathological descriptions and curative precepts are delivered, inspire him with confidence as to the universality of their application, and he adopts the treatment inculcated, until the results open his eyes,

and he at last perceives that numerous circumstances modify the character of intertropical diseases, as well as those of temperate climes; and that the treatment, in order to become eminently successful, must be always suited to the exact aspect which these diseases assume, as far as that can be determined, aided by enlightened views of the operations and laws of the animal economy in health and in disease.

There have appeared, however, some authors on intertropical diseases, to whom the foregoing remarks are not intended to apply, whose experience has been sufficiently extensive to convince them of the difficulty of the subjects on which they have endeavoured to instruct the profession, and at the same time to render them less confident as to matters, the relations of which have not been before them in that full and satisfactory manner which is requisite to the formation of sound opinions respecting them. Such writers are the landmarks of our profession, forming the best guides by which the inexperienced navigator through the dangerous channels of our science, can secure the safety of those committed to his care, and promote his own reputation.

It would have been desirable that, in the place of the numerous and contradictory opinions upon intertropical diseases which have issued from the press during the last half century, and bewildered the inexperienced reader, and which have been advanced chiefly by those whose field of observation and length of practice have been extremely limited,—the results of extensive and diversified experience of disease, amongst long residenters as well as recent comers into warm climates, had been furnished the profession; that the disorders appearing amongst Europeans, under every variety of circumstance and exposure in which they have been placed, had been faithfully reviewed, and considered in relation to the nature of the causes and the condition of the individuals on which these causes operated; and that the disorders occurring under similar circumstances, and from the influence of the same kind of causes, amongst the native inhabitants, had also received that degree of attention which the subject, as to both its inherent importance and the interest it is calculated to afford, when compared with that of European sickness, so unquestionably deserves.

It is, however, to be much regretted, that those who have enjoyed extensive opportunities of observing the diseases most prevalent in warm climates, as regards both the length of their experience and its diversity among all classes of Europeans, civil, military, and naval, as well as among the native inhabitants,—who have seen

those diseases under every vicissitude of season, and of public and civil service, in a great variety of countries and circumstances,—have, nevertheless, either allowed the results of their experience to perish with themselves, or continued to withhold information which could not fail of proving serviceable to their inexperienced brethren. It is chiefly with a desire of setting an example to those who have enjoyed such opportunities, to break the silence which they have so long kept, and to endeavour to form a part of what they have themselves acquired to those who may in any way stand in need of it, that I appear before the public. I shall obtain my object, if I find the attempt which I have imperfectly made be followed more successfully by others, abler than myself, to do the subject its deserved justice,—if others, who have seen and observed for a long series of years, the derangements produced upon the human constitution, of Europeans particularly, in warm climates, shall hereafter furnish to their inexperienced successors in the same field of exertion, the fruits of their matured judgment and observation, and thus fill up the sketch which I have imperfectly attempted to draw. And, above all, I shall be gratified, if what I am about to communicate shall lead the well-educated medical practitioner, proceeding to intertropical regions, to observe and to think; and to act rather from the rational deductions which he may form from a careful and comprehensive view of the circumstances producing and influencing the career of disease, than be guided by the confident and unreserved dicta of the imperfectly informed writer, whose advices are suitable only to particular circumstances, which circumstances may turn up but occasionally, or even rarely, in the general revolution of human events. The practitioner who shall thus endeavour, upon his arrival in a warm climate, to observe and to reason upon the derangements taking place in the human frame, will soon become the most decided and the most successful controller of their course,—will know when and how he should attempt to arrest them; and, when this idea cannot be entertained, will conduct them with the greatest safety to a successful issue, when it is in the power of art to accomplish this desired object. He will, moreover, observe that the diseases which have been described and held up to him, with regard both to their nature and treatment, as forming of themselves a distinct class, proper to intertropical climates, frequently occur in other countries; and, like other disorders, are merely functional at their commencement, but quickly running their course, and generally assuming a more acute aspect, owing to the concentrated nature of their causes, the

high temperature of the atmosphere, and the resulting influence of both, and of the diet and regimen adopted, upon the constitution.

The diseases of warm climates are also those of temperate countries during very hot seasons, more particularly in situations the nature of which approaches to that generally observable within the tropics; they are, in short, the prevalent diseases of other climates rendered more intense by more powerful causes, and these more continued in their action, and much more prolonged, and hence their effects become more marked than elsewhere. From this it is apparent, that the practitioner in temperate regions, if he wish to extend his knowledge of disease generally, or if he even be desirous of becoming acquainted with the forms which disorders assume at particular seasons, should not overlook the study of those derangements because they are more frequently met with within the tropics, and because they have received the too limited appellation of intertropical diseases. That these derangements of the human frame are more frequently met with in warm climates, and less so in temperate countries, is merely the result of the general order of nature as regards the animal economy, and the human economy more particularly.

The finer shades of conformation and constitution, it should be farther remarked, are such as to adapt man to the circumstances and vicissitudes of the country in which Providence has ordained him to exist. This conformation is chiefly the result of the influences which have continued to operate on the parents; and the effect at last becomes conformable with the general character of the causes producing it. The European is constituted in a manner the best suited to the climate which he inhabits; and a similar conformation of the system of man to the circumstances of the country, may be traced in every part of the globe. When, however, man migrates from the climate which contributed to generate the peculiarities of his frame, to one which is remarkably different from that to which he is assimilated, then disorders of various kinds and grades may be expected. Those organs which changes and peculiarities of climate chiefly affect, soon become deranged in their functions; and when they continue disordered for any time, additional disease is generated in many of the other organs of the frame, especially in those which are more intimately allied in function to them. What is here inferred *à priori* is evident in practice, particularly upon an intimate view of the succession of the phenomena of disease. But the climate, and the circumstances more intimately connected with the climate and the soil, or vicissitudes of tempera-

ture and of season, are not to be considered as the sole causes of disorder, for diseased actions proceed not always from these; and when they do apparently derive their origin from thence, other causes frequently co-operate with them in producing the effect. The modes of living, the diet and regimen of the individual, whose frame and constitution are unassimilated to the country, are generally as fertile causes of diseases as those which relate to the climate, inasmuch as they are but ill-adapted to the nature of the change which he has experienced, and to the peculiarities of his system, under the circumstances in which he has been recently placed; and these latter combine with the former class of causes in producing diseases which, but for this combination, might never have been occasioned. The individual who is, as it were, transplanted from the air and soil from which he has been, in a measure, formed, and in which he has longer vegetated, into those with respect to which he is quite an exotic,—instead of adopting the diet and regimen suited to the new circumstances into which he is placed, more generally pursues both the one and the other, according as the custom of those around him, or his own morbid appetites, seduce him. Although continually operated upon by causes, of whose influence his system is the more susceptible, the more recently he has undergone the change; although even the air which he breathes tends, at the same time that it animates, to modify his constitution to the new circumstances in which it is placed, and to generate disease in the process of transformation which is being effected; yet he more generally lives on as if he were entirely independent both of it and of the substances which he receives into his stomach; and, instead of adapting, in some degree, his diet and regimen to the climate in which he is placed, he is seduced by the sensations of his palate and his pleasures, which, when indulged in, occasion that condition of the system which, if not amounting to actual disease, is generally productive of it, under the most favourable circumstances of climate; and more especially during warm states of the atmosphere, and when it is loaded by moisture, terrestrial effluvia, and other causes of disorder.

CHAPTER I.

GENERAL VIEW OF THE CAUSES CHIEFLY PRODUCTIVE OF DISEASE IN WARM CLIMATES, PARTICULARLY IN INDIA.

PRIOR to entering upon a consideration of the particular diseases with which various organs of the human body are found to be most commonly affected in warm climates, it will be advantageous to take a view of those causes, to which the prevalence of disease, especially amongst the European and unseasoned inhabitants, are to be imputed. These causes being ascertained, their effects may be more readily inferred, and the means of removing them, or of counteracting them, may be pointed out with stronger hopes of receiving due attention from those for whose benefit the remarks respecting them have been made.

In this Chapter, then, will be considered,

1st, The most productive sources of disease in warm countries, and in hot seasons in temperate climates, namely, exhalations proceeding from the soil and decayed vegetation under the various circumstances favouring their extrication.

2d, Those causes of disease which operate by disposing the system to become affected by the former more efficient class of causes, and which belong chiefly to the important topics of diet and regimen.

SECTION I.—*On those Causes of Disease in Warm Climates which proceed from the Situation, Soil, and Vegetation of a Country.*

When the obvious and intimate relations subsisting between the earth's surface and the human species—between man and the soil on which he moves, the productions of the earth which surround and feed him, and the air which he is constantly inhaling into his body are considered—the conditions of these agents, as far as they can be recognised by sensible properties, or inferred from their manifest effects, become matters of great interest in medical

science, and of surpassing importance, in philosophical, civil, and political points of view. The conditions of the atmosphere resulting from the states of, and the changes taking place within and upon, the soil covering the torrid and temperate zones of the globe, are not only the chief and immediate sources, on the one hand, of the strength and perfection of the mental and corporeal constitution of man; and, on the other, of the diseases which harass him, stunting his physical and moral growth, or sweeping him from amongst living animals, of which he is the head and master; but are also the most productive, although the more remote causes of national character—of advancement in all the arts, sciences, and refinements of life in some countries, and of moral and physical debasement in others. In one, their beneficent operation may be traced in the freedom, prosperity, and greatness of its inhabitants; in another, their noxious influences are manifest in the degenerate and debased condition of the species, whose wants, habits, enjoyments, and desires, seldom surpass those of the higher animals. In short, the constitutions of the atmosphere derived from soil and situation, according to their nature, are not only the productive sources of disease, but also the chief spring of the perfection of the human frame, and of its degeneracy —the influential causes of the various degrees of human science presented to us in the different kingdoms of the world—of the freedom and greatness of nations, and of their enslaved and degraded conditions—of the rise and downfall of empires. They should equally interest the scientific physician, the philosopher, the enlightened legislator, and the arbiters of the fates of nations.

From a consideration of the extensive influence exerted by the states of the atmosphere on the physical and moral constitution of man, let us proceed to inquire into the soils, situations, and circumstances, producing terrestrial effluvia, which, mixing with the lower strata of the atmosphere, diminish its purity, and injuriously affect the human frame.

Of the various soils and situations productive of miasmata, the most deserving of notice, are low and marshy places. All situations within the tropics, or the temperate zones, which are low and subject to inundations, and places which are saturated with moisture, and abounding with the exuviæ of organic substances, are productive of unwholesome effluvia. Argillaceous soils, and the deep and rich alluvial earth which is found in the bottoms of valleys or ravines, and on the banks, or at the mouths of rivers, are also productive of miasmata whenever they are exposed to the action of a

powerful sun, particularly after they have been inundated, and when they abound with the remains of a luxuriant vegetation.

We have accounts, in the writings of the ancients, of the insalubrity of situations in temperate climates, such as have been now instanced; and daily observations in the south and middle of Europe, even, furnish us with numerous proofs of the same fact, and of various others closely allied to it. Several instances of the unhealthiness of marshy districts are to be met with in the works of Hippocrates. In his "Epidemics" we are told that the city of Abydos had been several times depopulated by fever, but the marshes being drained by his advice, it became healthy. The majority of the ancient writers present us with facts evidently pointing to the pernicious effects of low and marshy situations. The plague at Athens, which is almost medically described by Thucydides, may be rationally imputed to this source; and the pestilences, mentioned in the Roman writers as having visited Rome, can best be explained by assigning the exhalations proceeding from the surrounding marshes and low grounds, and from the occasional inundations of the Tiber, as their cause. The accounts given by Dionysius of Halycarnassus, by Plutarch, and by Livy, evidently show that the causes of disease, now to be considered, were known both to the historians and physicians of antiquity; and numerous instances may be adduced to show, that the means of removing and counteracting them were as well understood as at the present day. The lake Averna, mentioned by Virgil, is probably a poetical exaggeration of the effects arising from marshes; and the deeds of Hercules, the metaphorical record of his success in removing these most productive sources of disease. Strabo speaks very confidently of the good effects of the embankments of rivers, of drainage, and roads, in removing the causes of pestilence: and the groves, which were held sacred by the ancients, had obviously, in the majority of cases, the effect of confining the range of the miasmata generated by the adjoining marshes, and of protecting the inhabitants of the towns and villas in their vicinity.

The insalubrity of those situations of which we read in the works of the ancients, is still more fully shown in the writings of modern observers. And it is probable that those places have actually become more unhealthy than they were in former times, owing to the accession of alluvial soil which they may have received from the higher grounds in their vicinity, and from the depositions of soil at the mouths of rivers and in the bottom of lakes, thus converting a healthy lake to a marsh; to the removal of those screens or cur-

tains of trees which confined the exhalations to the source that generated them; and to the neglect of those means of drainage and cultivation which a greater population had rendered necessary. If the reader want proofs of this position, he will find them in abundance in the very able and learned works of Lancisi* and Brocchi.† If, then, marshy grounds and deep absorbent soils bearing a luxuriant vegetation in temperate climates are so productive of disease, as the experience of all ages has shown them to be, how much more insalubrious must similar places prove within the tropics, when the causes of diseases proceeding from these sources, and the susceptibility of those exposed to them, are heightened by a high temperature and great moisture of the atmosphere?

There is, perhaps, no practitioner who has had any extensive experience of the diseases of warm climates, or who has even attended merely to the forms which disorder assumes in hot seasons in temperate countries, who is not fully aware that the majority of the most prevalent maladies within the tropics, more particularly the different forms of fever and dysentery, are chiefly owing to the exhalations proceeding from marshy situations and from vegetable matter in a state of decomposition. These causes, it must be admitted, often require adventitious circumstances to bring them into active operation, or to promote and heighten their influence upon the system; but still they are the efficient causes, without the existence of which these diseases, and some others intimately related to them, would appear but seldom. Such, then, being the extensively baneful operation of terrestrial exhalations in vitiating the air, and through it of producing sporadic, endemic, and epidemic maladies, the importance of examining into the situations and circumstances usually productive of these exhalations, and of considering various topics connected with their propagation, modes of acting, and the means of limiting their formation and sphere of action, seems most apparent.

All places which are relatively low and saturated with moisture, and abounding with the exuviæ of vegetable and animal substances,—all rich, deep, wet, moist, marshy, clayey, and absorbent soils, covered by a luxuriant vegetation,—are productive of malaria whenever the temperature of the atmosphere is considerable, or

* *Lancisi, J. M.* de Noxiis Paludum Effluviis, eorumque Remediis, libri duo. 4to. Romæ, 1716, 1717.

† G. Brocchi, del Stato Fisico del Suolo di Roma. 4to. Rom. 1820.

G. Brocchi, Considerazioni sull' Agro Romano Antico, e sul Sito di Roma Antica. 4to. Rom. 1826.

whenever they have been exposed to the action of a powerful sun. At what temperature the extrication of the noxious effluvia commences, it is difficult to determine: but it seems evident, from a review of the diseases met with in the vicinity of situations such as have been now mentioned, in different countries, and at various temperatures, that noxious exhalations may proceed from them as soon as the temperature rises a few degrees above the freezing point, provided they abound with vegetable matter in a state of decay; and that these exhalations are more abundant, and their effects more marked and deleterious, as the temperature of the air increases, and in proportion as atmospheric heat is combined with moisture. In intertropical countries the noxious influence of the air in marshy and low situations, particularly at sunset or rise, is particularly well marked. This is owing to the rapid decomposition which organized substances experience under an elevated temperature joined to moisture—the moisture existing in the air holding in solution or suspending those terrestrial emanations which a soil, abounding with vegetable and animal remains and with water, had generated by the conjoined influence of a high temperature and of the elements constituting the atmosphere.

To render this inquiry more obvious, I shall first direct attention to the soil and situations most productive of those exhalations which diminish the purity of the air and affect the energies and health of the human species, and which existing in the atmosphere, have been long termed malaria by the Italians; and next to those places in tropical countries, particularly in India, which are most unequivocally the sources of noxious effluvia.

Of all the external agents by which the animal system is influenced, the atmosphere may be considered as the most immediately connected with the continuance of life; and upon its condition, as respects temperature, moisture, and the admixture of foreign gases with it, depends the health of the species in an eminent degree. As, however, the state of the atmosphere, as regards the relative proportion of its constituent elements which are absolutely requisite to life, is always the same in every situation, it follows that it is to those more accidental and fortuitous ingredients which are often present in it, that we must impute those effects with which experience in various climates makes us acquainted. Observation shows us that the air presents various degrees of moisture; that its electrical conditions vary; that it evidently more or less abounds in particular places with exhalations in a gaseous or fluid form given off from the soil or from substances placed in the soil; and

that those exhalations accumulate in proportion to the moisture of the air, its temperature, and the degrees of stagnation which it may experience.

The low grounds and marshes in the bottom of valleys and bordering rivers, particularly at their mouths, and which are generally overflowed during the periodical rains of warm climates, are most unequivocally productive of malaria. So evidently is this the case, that few persons visiting such places at the close of the day, during the night, or in the morning, escape the effects they usually produce: and there is, perhaps, scarcely an instance of an individual having slept, for even a single night, in a place so circumstanced, without suffering for his temerity. The low grounds at the mouths of rivers, or along their course, are rendered thus particularly insalubrious by the deep, rich, and moist soil which form them; by the quantity of rich mud and slime deposited upon them, particularly after inundations, and by the luxuriant vegetation, part of which must necessarily in a warm climate be always undergoing decay, with which they abound. In these situations,—many of them on a level with the river itself, or but little elevated above it, and in some places even below its usual current,—there is always a supply of moisture, so that effluvia is constantly being generated. This is particularly the case as regards the Jumna and Ganges. The latter river more especially during its course through the province of Bengal, presents every condition and adventitious circumstance on which the generation of malaria from its banks can be supposed to depend. The same may be said of the Burrampooter, as it flows through the same province; and there are no rivers of any considerable magnitude within the tropics which do not present us, during some parts of their course, and particularly at their confluences into other rivers or immediately before they fall into the ocean, with situations on their banks, whence unhealthy emanations are formed by the heat of the sun.

Rivers are, therefore, amongst the most productive sources of malaria, both along their course and at their terminations into the ocean. If rivers, of whatever size, traverse a flat country, and run in a slow and winding direction; if they have their banks covered by a dense underwood, by mud and mangrove bushes; if they overflow their banks and inundate the adjoining country; if they receive the filth and and drains of adjoining towns or cities, and carry with them the dead and putrid carcasses of animals, or contain much animal matter in a state of decay,—circumstances which the rivers

of the East generally present to the fullest extent,—then may places adjoining them be considered as furnishing the prolific causes of disease; and as being unhealthy in proportion to the extent to which these circumstances exist on their banks and in their immediate vicinity. Where large rivers terminate their course by more than one mouth, as they generally do when they flow through a low alluvial soil, but little elevated above the ocean, as the Ganges, the Irrawaddy, the Indus, the Orinoco, the Danube, the Mississippi, &c., and thereby form low islands, the production of terrestrial effluvia may be there certainly looked for whenever the temperature of the air is high. The islands formed at the mouths of rivers, by the soil washed down by them, owing to their extremely low situation, their rich and wet soil, and their very abundant vegetation, are amongst the most fertile sources of malaria—sources which become still more fertile after inundations or partial overflowings of the ocean; occurrences to which they are more or less subject, particularly during the monsoons. Many of the islands formed at the mouths of rivers are, in every respect, a marsh; and, indeed, but few rivers are to be met with, particularly in a warm climate, which do not give rise to very extensive marshes in almost every part of their course. Without referring to the more majestic rivers of the East, I may instance the numerous marshes formed by the Danube, particularly in its course through Hungary, and at its termination in the mouths by which it empties itself into the Black Sea—the rivers which pass through the Netherlands and Holland—the Thames below London—and several of the rivers of the south of France and Italy.

The country in the vicinity of rivers, particularly their mouths, are rendered more subject to inundations, from the quantity of diluvium carried down, from the cultivated grounds in their vicinity, by the numerous torrents running into them during the rains and monsoons. The soil and fine sand suspended in the waters of rivers, are deposited as soon as their currents are retarded by admixture with the waters of the ocean, and are thrown back by its surf and waves upon the land in the vicinity of their mouths, and even form sand banks and bars crossing the mouths themselves, obstructing their outlets, and hence inundating the adjoining country. These sand banks and bars, in process of time, increase until they form islands; and, in many places, the sand banks which are thus formed by the action of the surf upon the soil washed down by rivers rise above the level of the adjoining district; so that, if on any occasion the tides have been

unusually high, and the waves so great as to overleap this barrier, the country is inundated, the water is prevented by it from retiring with the fall of the tide, and thus the place becomes, in every respect, a noxious salt marsh until the water is evaporated. But it is not whilst the inundation continues that the malaria which is thereby generated is most noxious. During the evaporation of the stagnant water, and whilst the surface becomes gradually exposed to the action of the sun, intermittents and remittents usually make their appearance. But when the soil itself becomes exposed, and has remained so for a considerable time, to the action of a powerful sun, then fevers of a more malignant character frequently seize upon those in its vicinity: and this result is more particularly remarkable if warm weather has been of long and uninterrupted duration, and if the air at the same time has been still and moist.

The marshes formed in the course of rivers, and the low bushes and rank vegetation with which the banks and mouths of rivers abound, are less remarkably productive of disease in temperate and cold climates than within the tropics, and seldom produce those acute forms of disease which a hot country presents us with. It is true that agues of every type, remittents, simple continued fevers, and dysenteries of a mild form, and visceral obstructions, result from them to a greater or less extent, on all occasions, and particularly when concurrent causes are brought into operation. But as exhalations productive of those effects upon the human constitution are either weaker in their nature, or are formed less abundantly, or accumulate to a much less extent, than those given out from similar places in a hot country, disease is less general, less severe in its form, and less fatal.

When the sun's influence has been long powerful, when the atmosphere has been for any considerable time moist and warm, and particularly if it has also been stagnant or nearly so, and little disturbed by thunder-storms, places in temperate and cold countries, such as have been mentioned, become the seats of diseases, similar in all respects to those which are met with within the tropics. Indeed, this approximation of the character of disease, and of its prevalence, as far as the circumstances producing it are similar, is what every rational observer should expect. Instances illustrating the fact are numerous, and may be adduced from every kingdom in the globe. The marshes of Hungary, which usually occasion agues in the spring, are, after a long and hot summer, productive of the same forms of disease to which Europeans are liable soon after their arrival in those places in warm countries,

where similar localities are the more active agents of disease. Analogous proofs are furnished throughout Europe, particularly in its southern provinces, and in North America, whenever long and warm summers have succeeded to heavy and continued rains; and diseases possessing more or less of the true characters of intertropical disorders have prevailed to an extent proportionate to the nature of the locality and the concurrent circumstances, and would have continued to prevail had not the approach of winter put an end to the generation of the causes producing them.

A most important circumstance, which goes far to account for the much greater unhealthiness of moist and marshy situations in warm countries, is the quantity of animal matter, in a state of decomposition, which they present. The same circumstances which render vegetation quick and luxuriant, tend also to generate immense swarms of reptiles and insects: the exuviæ and dead bodies of which, mingling with vegetable matter in a state of decay and combining with moisture, give rise to miasms of a much more noxious description than those resulting from vegetable decomposition and moisture alone. In the course of my experience in warm climates, I have always been disposed to consider the number of insects and reptiles with which a place abounds, as more indicative of its unhealthiness than any other circumstance; for in it there is a most powerful cause of disease in its worst forms superadded to those already in existence; and, as the one cause is extensive and powerful, so, generally, is the other. The great unhealthiness of low, moist, and marshy places in temperate climates, during warm seasons, particularly in the months of July, August, September, and October, is as much owing to the immense swarms of insects which then abound, and which die during these months. Italy furnishes numerous proofs of this; and every warm country in the globe will verify the axiom, that a place is unhealthy in proportion as it furnishes, with the various causes of disease depending upon locality and temperature, animal remains and animal substances in a state of decomposition, mingled with the products resulting from the decay of vegetable matter.

Experience has shown that in pits and mines the air is often in such a state as to suffocate, almost instantaneously, those who attempt to breathe it. Some places are infested by peculiar diseases. In the apartments of persons ill of certain maladies, and in prisons and other places where crowds of people are confined together, disease, when once set up, is wont to make dreadful havoc. In all

these cases it is supposed that a certain noxious matter is dissolved by the air, and that it is the action of this matter which produces the mischief. This noxious matter is in many cases readily distinguished by the peculiar disagreeable smell which it communicates to the air; and it is probable this matter differs according to the disease which it communicates, and the substance from which it has originated. Guyton de Morveau attempted to ascertain its nature, but he soon found the chemical tests hitherto discovered altogether insufficient for the purpose; he has, however, put it beyond a doubt that the noxious matter which rises from putrid bodies is of a compound nature; and that it is destroyed altogether by certain agents, particularly those gaseous bodies which readily part with their oxygen. He exposed air infected by putrid bodies to the action of various substances; and he judged of the result by the effect which they had in destroying the fœtid odour of the air. From his experiments it appears there are four substances which have the property of destroying contagious matter, and of purifying the air,—the acetic, nitric, muriatic and oxymuriatic acids; but acetic acid cannot easily be obtained in sufficient quantity, and in a state of sufficient concentration to be employed with advantage. Nitric acid may be attended with some inconvenience, because it is almost always contaminated with nitrous gas. The muriatic and oxymuriatic acids are not attended with these inconveniences. The last deserves the preference, because it acts with greater energy and rapidity, and all that is necessary is to mix together two parts of common salt, with one part of black oxyde of manganese, to place the mixture in an open vessel in the infected room, and pour upon it two parts of sulphuric acid; the fumes of oxymuriatic acid are immediately produced, fill the chamber, and destroy the contagion. The oxymuriate of lime, mixed with sulphuric acid, will likewise answer this purpose.

The copious extrication of unwholesome effluvia from salt marshes and partial inundations of the sea, has been long admitted, and has only been disputed by one writer of eminence, who instances, in disproof of the position, the salt marshes of one particular district in the western hemisphere. But there, it is probable, some peculiarity existed in the soil and its productions, which rendered the formation of malaria impossible. The soil may have consisted of a deep bed of sand or gravel, but imperfectly covered by vegetation. Under such circumstances, unwholesome effluvia could scarcely be formed; for vegetable decay could neither be so rapid, nor the products from it be so copious, as to generate the

siderable intervals from each other, among the thick and low brushwood constituting the jungles of warm countries.

Nor are the more extensive forests unproductive of those exhalations which are the chief sources of intertropical diseases; for they frequently present nearly the same circumstances upon which the generation of miasmata depends; and whenever these circumstances are favourable, disease is the usual consequence. The quantity of the decayed leaves with which the soil abounds, its moist state, the moist, hot, and stagnant state of the air, particularly after the rains or monsoons, are the conditions upon which the generation of malaria by forests depends, and which are the frequent causes of fevers. Whilst, however, jungles more nearly approach to the condition of a marsh, and permit the transport of the exhalations to some distance from their source, unless circumscribed by screens of tall trees, forests confine the exhalations they generate to their immediate limits, and seldom permit any to rise above the verdure of their highest branches, or to extend beyond their outskirts. The free circulation of air in places on the confines of a wood, or even around the outskirts of the wood itself, renders such situations even healthy, in comparison to the interior of a dense forest. Much will, however, depend upon the locality, and upon the kind of trees forming a wood or forest. In warm climates forests are met with in a great variety of situations,—covering the sides of mountains and the tops of hills, as well as extending into the plains and valleys. It is chiefly in the latter places where woods become productive of malaria; for there the atmosphere is more frequently stagnant, particularly when they are protected from the full force of prevailing winds by intervening hills. In these latter places, also, the soil and air are much more moist; hence the ground intervening between the large trees, forming a wood or forest is often covered by a rank and luxuriant vegetation; the decayed parts of which, with the leaves fallen from the forest trees, speedily generate in the moist soil very unwholesome emanations, which may be limited to the precincts of the wood wherein they were produced, or wafted to some distance, according to the circumstances of the situation, climate, and season. Forests, also, in warm climates, are always, particularly in low and moist situations, in a state of vegetation, so that the soil is thereby more completely sheltered from the winds, and from the sun, and the air within them is more frequently sultry, moist, and stagnant, than is the case with the woods or forests of temperate or cold climates, where there is at one season in the year a complete denudation of the trees.

Another important circumstance which should be viewed in connexion with the noxious effects observed to proceed from the woods covering low situations, is the nature of the woods themselves and of the underwood. In temperate and cold climates they resist decay much longer, and contain more tannin and more of the terebinthinate principles; so that the emanations proceeding from these sources are less concentrated and less noxious in their effects. In every instance, therefore, much will depend upon the climate, and the nature of the locality and soil where woods or forests are met with; and much also may be imputed to the nature of the woods themselves, and the extent to which their trunks are surrounded by underwood.

When the familiar influence of wet and close woods and forests in the southern countries of Europe, in producing the usual effects of malaria, is considered, there will be less hesitation in allowing a similar influence to be present from the same causes within the tropics, and to a much greater extent—the circumstances productive of such influence existing there to a greater extent, and in a more manifest manner.

There is one other important circumstance connected with this part of the subject: it has been supposed that, if it be granted that woods and forests in low, wet, and sheltered situations, are productive of endemic disease, such disease will disappear on the clearing of the soil. This, however, is not a correct inference, and cannot be supported either by *à priori* reasoning or by facts. It has been already stated that the deep, moist, and absorbent soils of low and sheltered places, when covered by woods or forests, are less noxious to the surrounding neighbourhood, and less productive of miasmata, than they would probably be if they were covered by grass or jungle: for, in the latter case, they would be more completely subjected to the action of the sun, and the malaria thereby generated would be more readily transported to places in the immediate vicinity, because it would not be arrested in its course by woods or tall trees, by which it is evidently attracted:—whilst, in the former, the woods and forests protect the soil and vegetable matters suffering decay in it, from the influence of the sun, and retain the emanations which are formed, as attentive observation has shown, although it has not explained the manner in which this is effected. When, however, a deep, moist, and rich soil, is deprived of that very rich and majestic covering which protected it from the influence of the sun, and at the same time guarded the inhabitants from the miasmata which were actually produced from

it, and is exposed to the direct action of the sun, and to a hot and moist atmosphere, with the accumulated load of vegetable matter with which it had been enriched through ages, much more noxious effects are observed to follow, than when it remained in its former shaded condition. It may be generally remarked, that when the ground is covered by a wood or forest, a weaker or less noxious emanation is apparently generated, for intermittents or remittents, and those of a mild character, are the only consequences; but when the action of the sun upon the rich moist soil takes place, exhalations are formed of a more noxious description, and malignant remittents, continued fevers of a bad type, yellow fevers, and dysenteries, usurp the place of the milder forms of disease, which the same place, when differently circumstanced, will produce. Places of the kind now noticed are productive, it is true, annually, and at particular seasons more particularly, of agues; but when cleared and exposed to the influence of a powerful sun, they become the sources of the most malignant and most pestilential diseases; appearing, it must be admitted, at longer intervals, and requiring particular circumstances—as previous inundations, followed by long and great solar heat, moist and stagnant states of the air, the exposure of new portions of earth to the sun's rays, &c.—for their production.

In proof of the assertion now made, the observations of the late Dr. Rush, whose science and candour did honour to the profession and to his country, may be adduced. He observed, that the endemic disorders of Pennsylvania were, by clearing the soil, converted into destructive epidemics; and that it was not until the soil had been subjected to cultivation for a long series of years, that a tolerable degree of healthiness was restored. Analagous facts have presented themselves in various parts of the East; but although a continued cultivation may restore the salubrity of a place which had been diminished by clearing the soil, in low situations, of the woods and forests which covered it, and by exposing its wet and luxuriant surface to the action of the sun, in temperate and northern climates, it is by no means so clear that the same industry will be followed by so happy an effect within the tropics. The West India Islands furnish proofs even of the contrary: for it is allowed, that upon their discovery, and for many years afterwards, they were less productive of disorder than at the present day, and diseases were then of a less malignant character. It must, however, be admitted that various circumstances, occurring either singly or concomitantly, but generally the latter, are required to produce those more malig-

nant forms of disorder; hence they supervene at longer intervals, and with greater irregularity, than the slighter disorders resulting from the previous conditions of the soil. The history of the West Indies, of the southern states of North America, of the epidemics of New York and Philadelphia, of many places on the coast of Africa and South America, particularly the coast of Guinea, in the former, and Guiana, in the latter; and even the precise information furnished us respecting various places in the southern countries of Europe, confirm the view now taken. The district of Bresse, in the Lyonnais, illustrates this in a very pointed manner. When well wooded, it was comparatively healthy; but now deprived of its woods, it is always subject to endemics and epidemics. In this district the clearing the low and wet soil has exposed it more to the action of the sun, while the exhalations from its numerous marshes and stagnant pools are no longer confined by surrounding woods and forest trees. Similar examples may be adduced from Monfalcon*, Devèze†, Bailly‡, and others.

It was long since remarked by Pliny and other writers of antiquity, that trees absorb the exhalations from the soil which prove injurious to the human species. Whether the influence of trees in diminishing the bad effects resulting from terrestrial exhalations proceeds from their simply obstructing the passage of the miasms existing in the lowest strata of the atmosphere, or from their actually absorbing the miasms themselves, along with the moisture and dew, which rests upon their leaves, and with which marsh miasmata seem to be intimately connected, or from shading the soil from the action of the sun, thereby preventing the generation of a luxuriant vegetation, as well as the extrication of noxious exhalations, the power they possess in low, wet, and marshy situations, of moderating and confining the generation of malaria is indisputable; and therefore, where lagoons, marshes, low places subject to inundations, either from the overflowing of rivers or from irruptions of the sea, cannot be drained or preserved from these occurrences, the planting of the more majestic forest trees in such a manner as shall best protect the vicinity from the exhalations which are formed, becomes a matter of the most serious import to the community.

Of all the places productive of disease in warm countries, there

* *J. B. Monfalcon.* Histoire Médicale des Marais, &c. 8vo. Paris, 1824.

† *J. Devèze.* Traité de la Fièvre Jaune. 8vo. Paris, 1820.

‡ *E. M. Bailly.* Traité Anatomico-Pathologique des Fièvres Intermittentes, &c. 8vo. 1825.

are none more deserving of notice than rice grounds. They are always undergoing alternate inundations and cultivation; and are generally situated, with respect to rivers and high grounds, so that the mud and filth carried down by the former are deposited on their surface upon the subsidence of the water, while the latter protects them from the perflations of the prevailing winds. The white inhabitants of districts surrounded by, or abounding with, rice fields, are generally the most sickly and weak; and strangers remaining for any time in their vicinity are commonly soon attacked by the diseases ripe in such places. The inhabitants of countries in the south of Europe, and the white residenters and natives of the southerly parts of North America, where, owing to the situation and circumstances of the soil and climate, rice is extensively cultivated, seldom possess the healthy appearance of their species, even at any period of their short lives, and seldom live longer than the time which is required to bring the native of a healthier climate to maturity. It would seem to be wisely ordered, that countries which contain, owing to their situation, soil, and climate, the seeds of certain diseases to which Europeans become invariably subject when they migrate thither, should be peopled by a particular and an appropriate race, of a different constitution and character, and calculated to pass their existence in such situations without having their lives materially shortened, or being more frequently subject to disease, than the natives of cold or temperate countries. This adaptation of the different varieties of our species to the nature of the country they inhabit, and the consequences arising from migrating to places where the relation between the climate and the particular variety of our species no longer holds, affords some of the most interesting, as they are the most philosophical, topics for the consideration of the medical inquirer.

The grain coast of Guinea, which furnishes the most perfect form of the negro, is the most insalubrious climate with which Europeans are acquainted. Subject to inundations during the rainy seasons, and no where almost rising more than a few feet above the level of the sea, covered by a dense underwood and luxuriant vegetation in some places, abounding in lagoons, marshes, and jungles in other places, and admitting only of a rice cultivation, a European scarcely ever passed a night on its shores, without becoming the subject of disease; and yet, in this wide district of country, the most unfavourable in the whole globe to European life, and indeed to all the higher animals, particularly those which have been domesticated with man, or have been reared for his sustenance—where

neither the horse, nor the dog, nor the bullock, nor the sheep, is scarcely ever seen—the negro variety of our species exists in its greatest perfection, presents the most perfect symmetry, lives to a good old age, and is seldom the subject of disease. If we look closely into the conditions and characters presented by a district or country, and view it in relation to the constitution of its inhabitants, we shall observe a very intimate connexion existing between the one and the other, in whatever quarter, district, or kingdom of the globe we may direct our inquiries.

It is notorious to every traveller who has visited the south of Europe, and has even, in the slightest manner, turned his attention to the state of the inhabitants cultivating the rice grounds, that they are the subjects of the worst form of endemic disorders, and of visceral obstructions. The same fate also awaits the white population of the more southerly states of North America; whilst the black cultivators are exempt. The extent of disease proceeding from the cultivation of rice in Italy, Sicily, and Greece, has been sufficiently shown by Bailly, Targioni, Grottanelli, and others. Indeed, there cannot be a doubt as to the effects which the circumstances connected with these species of husbandry produce upon the constitution of the white variety of the human race. The exposure to the influence of a powerful sun, of a rich, wet, and low soil, which has undergone repeated inundations and irrigation, and which abounds with vegetable matter in a state of decay, are the conditions upon which the formation of malaria in rice grounds seems to depend; and it matters but little whether these conditions result from the cultivation of rice or from the natural circumstances of the soil and climate, provided that they actually exist. Throughout India, Ceylon, Java, and almost all the countries of the East, where the nature of the locality admits only of a rice and indigo cultivation, Europeans are continually the subjects of disease to a greater or less extent; and although the Hindoo and Malay population are less liable to be affected, owing to that adaptation of constitution to the soil and its productions, as already noticed, yet they are occasionally slightly influenced by the same causes. It may be true that those places, particularly within the tropics, which are subjected to the cultivation of rice, would, owing to the nature of the circumstances generally characterising them, be still productive of malaria, if left to nature, although not to the same extent. But as this is the only, or at least the chief, species of grain they are capable of yielding, if thus left to the dominion of nature, whole districts would soon become depopu-

lated. This kind of cultivation, however, brings the inhabitants more within the sphere in which the endemic causes of disease operate; so that if a white population were employed in it, within the tropics, it would soon altogether disappear before them. The habit of body and constitution of the natives render this, and all other forms of cultivation suited to warm climates, comparatively innocuous to them, unless during certain seasons and epidemic conditions of the air which occasionally occur, and with which the medical history of hot countries makes us acquainted.

It has been clearly ascertained that the rice grounds in some parts of India and the East, as Trichinopoly, Tanjore, &c., where the plantation is almost constantly inundated, are less fertile in the production of disease than those which after inundations are exposed to the action of a powerful sun. This consideration will assist in explaining the greater unhealthiness in the neighbourhood of the rice grounds in the south of Europe, as well as the very sickly state of Seringapatam, and its vicinity.

Lakes and pools with shallow margins and low banks are generally productive of disease, in proportion as they are low, and as the climate in which they are situated is warm. The specific conditions on which their unhealthiness depends must be evident from what has been already advanced; and in proportion as those are present in any particular case, so will the production of marsh miasmata and disease be more or less abundant.

Canals may be adduced as another source of disease, particularly when they are neglected, or are filled by foul and stagnant water. Canals are not frequently met with in tropical countries, excepting China, where they are generally kept in good order. At Batavia, however, where they are numerous, and intersect even the town itself, they are amongst the most influential causes of disease. Containing putrid and stagnant water, holding the remains of animal and vegetable matter in a state of decay, with the bodies of dead animals floating in them, and constantly imparting to the air the most noxious miasms, Europeans who come near them, if predisposed to their noxious influence, soon become the subjects of disease. This was sufficiently evinced during the British expedition to Java, and whilst the city of Batavia remained in our possession.

Next to canals, in the production of malaria, may be enumerated ditches surrounding fortified towns or cities. There can be no doubt that the ditches surrounding towns, either when they become foul, or when they are dried by great or continued heat, become the source of a similar exhalation to that which is given out by

marshes, and are often the cause of disease to the inhabitants, for whose protection they were made. And it is more than probable that the fevers and dysenteries which have been so often noticed as having weakened both the besieged and the besiegers, have been more owing to this circumstance, heightened, it is true, by hot, moist, and stagnant states of the air, and by the other powerful causes to which a besieged population and a besieging army are exposed, than to those causes to which they have been more generally imputed. Ditches of whatever description, whether used for the protection of towns or of camps, or for draining the soil, are necessarily productive of malaria, particularly when they are partially dried up, or soon after the mud and vegetable and animal exuviæ they contained have been thrown from their bottoms upon their sides, and exposed to the action of the sun.

The same efficient circumstances which point out ditches as productive of terrestrial exhalations, are also present with respect to many of the tanks which are made in India, particularly in the provinces of Bengal. In many places, owing to the superstition and ostentation of rich natives, more tanks are formed than are kept in good order; and those which are neglected assume an appearance, in many respects, similar to ditches or stagnant pools.

The influence of pools in the production of disease must be evident from what has been already advanced. Their agency and effects have been most satisfactorily illustrated, in conjunction with those of canals and ditches, by Monfalcon, Bailly, and others; and the characters of those diseases which have been observed to abound in many places in the south of Europe, where they are met with during warm seasons, have been well described by these writers, and are, in most respects, evidently the same diseases which the practitioner has to encounter within the tropics.

The exposure of new earth, particularly if it be rich, wet, and abounding with vegetable and animal remains, to the influence of a powerful sun, has been already shown to be, upon clearing the soil, and on its first cultivation, productive of disease. But rich, dark, and absorbent earth, which is usually always exposed during the dry season, is also a very fruitful source, particularly if it lay low. Of this, numerous instances occurring within the tropics are on record; and others may be adduced from temperate countries. At Kurnoul, on the banks of the Toombudra river, the soil consists of a wet, rich, and adhesive dark earth, of great depth, and which, when exposed after the rains to a powerful sun, exhales a very copious moisture, and opens into deep chasms. Owing to

this condition chiefly,—for nothing else can account for the circumstance,—disease was most prevalent amongst the troops in this station, and the mortality considerable. The banks of the river are clean and shingly, and there are no marshes, nor jungles, nor woods of a description calculated to account for the extent of the endemic diseases which were encountered in this place.

Having thus pointed out the places and conditions of soil most productive of miasmata, it is proper to notice those particular states of the air which seem to promote the generation and accumulation of them. It should, in the first place, be kept in recollection, that the result of observations, made in various parts of the globe, and particularly within the tropics, proves that the various soils and places which have been described as most productive of malaria have been considered as generating it, more especially under particular conditions as regards dryness or moisture. Places which are usually the sources of noxious effluvia do not generate them, when completely inundated. Many unhealthy districts within the tropics are most tolerable to European constitutions, whilst they are completely covered by water, so as to leave no part of their surface exposed to the sun's rays. But as soon as these, as well as all other places capable of producing malaria, are made bare, so that the air and the sun's rays have sufficient access to them, then the formation of effluvia proceeds, and increases in proportion as the exposure becomes more or less complete, until the moisture of the soil, together with the products of vegetable and animal decay contained in it, are completely given out; and places which have thus exhausted their exhalations during their exposure to the influence of the sun and atmosphere, may speedily have them renewed upon the accession of that supply of moisture which is requisite to their generation. Thus, any low, rich, and swampy district within the tropics, which is inundated during the rains or monsoons, and dried up in the hot season, shall, during the time that it is completely under water, be found to be perfectly healthy as respects the European constitution: but as soon as any of its surface becomes exposed after the rains, then agues appear; and when its whole superfices is acted upon, then fevers of a more severe and dangerous type make their appearance. After the moisture and the products of vegetable and animal decay have been completely exhaled, the diseases proceeding from this source disappear, until a fall of rain again furnishes one of the requisites to the production of terrestrial exhalation: hence it is that disease often appears upon the commencement of the rains in warm climates. Places which have

been completely inundated during the rains or monsoons, or which have been in a marshy state during the dry season, are generally rent into deep and wide fissures, which allow the air and the rays of the sun, and the consequent heat, to reach to a great depth; and thus exhalations are generated and poured out from the lowest strata of the soil through these fissures, and they become more copious and more noxious, the greater the heat and the longer the drought, and the deeper and wider the fissures which are thus formed in t he earth.

In warm climates, all the conditions of the soil which have been enumerated as productive of the efficient causes of disease exist in the extreme. The ultimate, as well as the proximate, constituents of the plants, growing from a soil within the tropics circumstanced as we have described, and their rich and succulent nature, are such as favour their rapid decay, and promote the generation of immense swarms of insects and reptiles; and the products formed by the decomposition of both the vegetable and animal bodies, which an intertropical country so very abundantly yields, are more concentrated, because more rapidly and more copiously formed, and are consequently more deleterious, as respects their impression upon the human frame, than those of temperate and cold climates. In proportion as the temperature of the air is higher, and as its humidity is greater, and as the soil is more rich and moist, and more loaded with the remains of organised substances, and as its surface abounds more with vegetable and animal productions, will be the quantity of miasmata proceeding from these sources, and floating in the atmosphere, be great.

One of the chief effects of a high temperature is to hasten the decomposition of organised bodies: another is to raise the capacity of the air for humidity. The atmosphere of an intertropical country, at particular seasons especially, is uncommonly moist. This is more remarkably evident in insular situations, and in places on the sea-coast immediately before and after the rains and during still states of the atmosphere. This humidity of the air, particularly if combined, as it usually is, with great warmth, and occasionally with an almost stagnant state, acts upon localities similar to those which have been noticed, in a double capacity, favouring at once a most abundant vegetation, and hastening decay as soon as the vegetable vitality departs. The moisture, also, which exists in a warm atmosphere, holds in solution that principle or effluvium which is formed from the soil, and which, contaminating the air, produces endemic and epidemic diseases. That such is the case,

is shown by the prevalence of those disorders which proceed from this source during still and moist states of the weather, particularly in warm climates, and by their total disappearance before dry winds. It has been frequently remarked on the west coast of Africa, where the endemic causes of disease now under consideration are most abundant, that if the Harmattan wind, which is most remarkably dry, follow a still and moist state of the air, all the diseases proceeding from the terrestrial emanations accumulated in consequence of this state of the weather rapidly disappear; and similar occurrences, of a less remarkable kind, occasionally supervene in all warm countries. Moist states of the atmosphere act, therefore, in accelerating vegetation, and promoting the generation of insects, in hastening vegetable and animal decomposition, and in concentrating and combining with the miasms generated from this and other sources. The moisture of the air seems to dissolve or combine with marshy and terrestrial exhalations, inasmuch as the latter become much more manifest in their effects during the existence of the former; whilst these effects soon entirely disappear before a dry state of the atmosphere. The influence of the Harmattan wind has already been adduced in proof of this; but other causes, as well as the condition of the air as regards its humidity, are concerned in these effects. Humidity will not so readily be productive of mischief, if there exist a free current and circulation of air, because time is not allowed for the accumulation of the effluvia within circumscribed limits. But when the atmosphere is perfectly still, in conjunction with great humidity, it soon becomes loaded with those exhalations to which it thus offers so great an affinity. Hence the danger of approaching the sources of malaria during still states of a humid and warm atmosphere, particularly at the close or dawn of the day, when the exhalations are condensed, or unrarified by the solar heat, and when the system is more open to their noxious impression. During moist states also of a warm atmosphere, the equilibrium of its electrical conditions is disturbed, as well as that of the whole body, and the changes effected upon the blood in the lungs during the function of respiration, is somewhat impeded. The good effects of a free and quick renewal of the atmosphere in unhealthy places; of a thorough ventilation; of high winds; of tornadoes, hurricanes, and thunder-storms, in dispersing and altogether sweeping off the exhalations and effluvia proceeding from the exuviæ and decay of animal and vegetable substances, must be sufficiently apparent from what has been adduced. The dry winds and the thunder-storms, so fre-

quently occurring within the tropics, are the means which Nature resorts to in order to dilute or entirely dissipate the exhalations proceeding from, and accumulating in, the places similar to those noticed: and if hese more violent commotions of the atmosphere were not to supervene frequently, very many districts of country would be rendered uninhabitable, both by man and by many of the higher animals. Indeed, it has been often observed, that when the air has continued long undisturbed by winds or thunder-storms, and have been long hot and moist, disease assumes a pestilential character. Of this fact medical histories furnish numerous examples. The very remarkable epidemic fever which ravaged the West Indies and the coast of America was ushered in and accompanied, according to the testimony of Rush, Chisholm, Clark, Devèze, and others, by long continued droughts, a still and humid state of the air, and a most unusual absence of thunder-storms and hurricanes. Various other instances might be adduced of a similar relation existing between the states of the air and the prevailing diseases, both within and without the tropics. Indeed, every practitioner who has enjoyed any experience in warm climates, has had numerous opportunities of observing the manner in which the character of the prevailing diseases, and their propagation, have been influenced by the prevalence or absence of thunder-storms and tornadoes. It would even seem that the frequency of these commotions of the atmosphere, as well as their violence, have a very intimate relation to the unhealthiness of a country. Experience has long convinced me that this relation actually subsists; and that it should exist as a general result, is not to be wondered at, since the same conditions and circumstances on which the unhealthiness of a climate depends are also those which give rise to thunder-storms and hurricanes, and which render their frequent occurrence necessary to the health of those by whom the country is inhabited. The western coast of Africa could not be endured, even for a season, by the European inhabitant, and perhaps scarcely long by its natives, did not the Harmattan wind occasionally blow, and tornadoes of most surprising violence occur frequently during the most unhealthy seasons of the year. A similar remark may be made respecting the hurricanes of the West Indies, and the tornadoes and storms which frequently blow in the East. The dense, moist, hazy, and close atmosphere, loaded with the exhalations of putrid insects and reptiles, and of the soil and its vegetable productions, after remaining for a time still and suffocating, enervating those who are destined to breathe it, and infecting their circulating

fluids, suddenly becomes kindled into the most vivid commotion—sweeping before it whatever opposes its progress, and blazing out in one ocean of flame, which seems momentarily extinguished by the torrents of rain which rush furiously to the earth, and is immediately again lighted up to its greatest brilliancy and widest extent; so that the atmosphere presents the most extensive and the most sublime conflict between fire and water which the imagination can paint, whilst the irresistible force of the winds seems to sweep both combatants from the field.

The general result of these frightful commotions is to destroy those exhalations which have accumulated in the depths of forests and ravines, and in the bottom of valleys, to purify the air, and to refresh the entire offspring of nature. Their beneficial effects cannot fail of being recognised by the observing practitioner, whilst the unwholesome tendency of that climate or season on which their frequency depends, becomes equally apparent to his notice. But the circumstances which give rise to them would be productive of greater mischief if they did not supervene; and therefore their occurrence is to be looked upon as a benefit, or at least as a lesser evil, calculated to counteract a much greater one, which would inevitably occur if the other did not prevent it.

Besides the influence of humidity in the generation and accumulation of malaria, the operation of the electrical fluids should be taken into account. But to what extent, or in what manner these fluids act, we have no precise information. That they have some action, however, is most probable, inasmuch as their active agency in the animal economy is evident, and as unhealthy states of the air have been observed to have been related to derangements in the electrical conditions, or in the equilibrium of the electric fluids. It is also most probable that the electricity proceeding from the earth at particular parts may so influence the condition and extrication of the gases and the effluvia which the soil yields in those places, and may so combine with them, as to form the efficient principle or cause of disease. Of this, however, we have no positive knowledge; but the review of various states of the air and of the seasons, in connexion with the circumstances of the soil, which have been noticed as productive of disease, and both considered in relation to what information has been furnished respecting the electrical conditions at the time, seem to point out some connexion beyond mere coincidence: but in what that connexion consists, or whether it is to be considered as one of cause and effect, it is not easy to decide. Much requires to be observed

with respect to this important subject, particularly within the tropics; and much of the credit which is to be placed on observations respecting it will depend upon the talent and acquirements of the observer, and upon the means of observation which he shall employ.

SECT. II.—*On the Nature, Properties, and Effects of Miasmata.*

The intrinsic nature of that matter usually denominated marsh miasm and malaria, and which has so powerful an effect upon the human constitution, that more than two-thirds of those who die in warm climates are cut off by its influence, has never been satisfactorily shown, although repeated attempts have been made to ascertain it. Dr. W. Currie supposed that marshy exhalations consist of hydrogen and ammoniacal gases, and that the unhealthiness of low and marshy places arises from a deficiency of oxygen gas in the atmosphere; but eudiometric experiments have proved that the air over those situations contains its due proportion of oxygen, and that it is unwholesome owing to the presence of some foreign substance. Subsequent experiments, performed by Gattoni, Moscati, Brocchi, and Julia, have shown that marshy soils give out carburetted hydrogen; but their effects cannot be imputed to this gas, as it has been found incapable of producing them. From the numerous experiments which have been made on the continent, in order to ascertain this point, it must be inferred, that we have no knowledge of the intrinsic nature of the substance which, vitiating the air in the vicinity of places which have been described, produces most baneful effects upon the human constitution. But a careful comparison of the effects which it produces, and a review of its phenomena, and of the laws which it seems to observe, may render the following remarks deserving of attention.

The sum of our knowledge of the nature of this poison seems to be, that it proceeds from those elements which exist in a rich soil and nourish the vegetable and animal kingdoms; and that these elements, when subjected to the action of the sun, together with the influence of the air and moisture, form new combinations, which are volatilised by the sun's heat, and readily combine with the moisture present in the lower strata of the atmosphere. This conclusion seems to be supported by the physical and medical history of terrestrial exhalations, as far as they have been investigated. That they combine with aqueous vapours either during the period of their formation, or when they rise into the atmosphere, is proved by various circumstances. Whilst the vapours exhaled by the heat

of the sun, and carrying with them the miasms given out by the soil, are kept in a state of rarefaction by the sun's influence, and conveyed to the higher regions of the atmosphere, then the usual effects of these miasms are not produced. But as soon as the heat diminishes so far as to permit the vapours to descend and to become condensed towards the earth's surface, then the effects resulting from terrestrial effluvia become manifest. In the former case the effluvia are rarefied, along with the aqueous vapour, so that they are incapable of making a hurtful impression on the system when received into the lungs: in the latter case they are condensed with the vapour, and precipitated to the lowest stratum of the atmosphere, and are inhaled into the body in a larger quantity, and sufficient, in many instances, to produce effects according to the circumstances of the individual. Hence it is that the evening and night dews are much more to be feared in all districts and countries subject to terrestrial effluvia than any other period. This precipitation of the aqueous vapour and malaria forming mists and dews, particularly in low situations, is especially to be dreaded during still or stagnant states of the atmosphere. Within the tropics the earth retains its heat, after the sun has gone down, longer than the air. This circumstance tends to the accumulation of effluvia upon the surface; for, as their extrication from the soil proceeds to a considerable extent after the sun has gone down, they are no longer rarefied into the higher regions of the atmosphere, but are mixed with the dews and vapours descending at the same time; so that the sources whence exhalations are formed, being generally the lowest, are also the reservoirs wherein they accumulate. In warm climates their accumulation is in some degree prevented during the land winds which blow through the night. But these winds are frequently too light to sweep away the exhalations, which are collected in ravines and sheltered valleys; and when they are sufficiently strong for the purpose, they only serve to convey them to other places. It is chiefly during the calms which precede and follow the night winds that the accumulation of effluvia in low places takes place; and as these calms, with their attendant vapours, are usually about sunset and sunrise, exposure at those times should be avoided.

Malaria has been considered, in addition to its possessing the property of combining with aqueous vapour, as being specifically heavier than atmospheric air; and its presence and accumulation near the surface of the soil which produced it, has been attributed as much to this property as to its combination with moisture. Of

this, however, there is no direct proof, although the circumstance in question seems very probable from the following facts. It is well known to the inhabitants of Italy, and to all who have travelled in that country, or who have been any time within the tropics, that elevation above the sources whence malaria proceeds furnishes exemption from its influence, and that the exemption is in proportion to the height of the elevation. In many districts of Italy and Greece the villages are built upon elevated rocks, or hills rising abruptly above the surrounding low grounds, in order to avoid the miasmata which they generate. Sezza, which is beyond the reach of malaria, is about three hundred yards above the Pontine Marshes; and Tivoli, which is elevated about a hundred yards above Rome, is much healthier than this city. According to Humboldt, Encero, situated above Vera Cruz, is not affected by the diseases which render this port and its adjoining coast so much dreaded. This writer states that 920 yards, the elevation of Encero above the sea, is the highest limit of the yellow fever, the product of the most concentrated state of malaria. Dr. Hunter has stated that even the elevation of one floor is sufficient to afford a very great exemption from the diseases arising from terrestrial exhalations. He found that the number of cases of fever occurring on the ground floor of the barracks near Kingston, Jamaica, were, in relation to those affected in the first floor, as three to one. Similar facts have come under my own observation in various parts of the East. Whether these circumstances are to be explained by the affinity which the effluvium has to aqueous vapour, or by allowing it to possess a great specific weight, does not materially influence the facts which have been adduced, nor the much greater number more which might have been mentioned; nor are the inferences which may be drawn from them materially affected by adopting either opinion. Dr. Ferguson has supported a third opinion, different from the two now referred to, and supposes that the marsh effluvium has a strong attraction to the surface of the earth, which tends to keep it near the situation whence it proceeds; but although places are generally more exposed to the effects of malaria in proportion to their lowness, yet the prevalence of certain winds, and other circumstances, occasion many exceptions to this as a general inference.

It would be interesting to ascertain the greatest height at which marsh exhalations produce their effects. My observations, added to those recorded by various writers, have furnished results so different, as to lead to the conclusion that the elevation from its source

at which malaria may arrive, so as to be productive of disease, will depend upon the general temperature of the climate and of particular seasons, and upon the humidity of the atmosphere, and the prevalence and force of certain winds, and very materially upon the quantity of malaria which any particular part yields.

It should, however, be mentioned, as an exception to the position which the preceding facts seem to prove, that there are circumstances which render some elevated situations even more unwholesome than places near the margins of marshes. This is owing to the attraction which fogs and vapours have, as they rise from low valleys and marshes, to the ridges and sides of hills which overhang them. This is shown by the heights which rise out of the marshes at Port d'Espagne, in Trinidad. Similar instances are afforded by the island of Dominica, Jamaica, &c. in the West Indies, and by several places in the East. Other situations, also, both considerably elevated above and retired from the sources of malaria, are affected by it to a very great extent; but this is entirely owing to the prevailing winds passing over them, particularly those which blow during the night, without having been broken in their course by any abrupt ascent or ridge of rocks, and without having been deprived of their malaria by passing over woods or forests, by the foliage of which it is evidently attracted.

Malaria, as already observed, seems to be attracted by screens of trees, which often serve as one of the most efficient means of circumscribing limits to the baneful effects of this agent, when its source cannot be destroyed. This fact was turned to advantage in former times. It should also be known, that this noxious exhalation seems to be absorbed in its passage over water. This has been proved in numerous instances. Places situated on the healthy and dry banks of lakes or large rivers have experienced but little inconvenience from the marshes bordering their opposite banks, whilst districts much further removed by land from these sources of disease suffered from their vicinity. Nor was this marked difference in the effects owing to the prevailing winds; for whatever advantage this circumstance was capable of producing, was in favour of the latter place, and against the former. That malaria, or marsh-miasm, is actually absorbed during its passage over water, is further proved by the exemption of crews of ships anchored on coasts abounding with this poison, and lying in rivers sufficiently wide to allow them some distance from their marshy banks. This, viewed in connexion with another circumstance which should be recollected in an examination into the phenomena which this agent

of disease evinces, and which will come under immediate consideration, may furnish some useful hints to those who may have, as all practitioners in warm climates will have, opportunities of turning their knowledge of this part of the subject to a practical advantage.

With respect to distance from its source, at which the marsh-poison affects the human constitution, no precise opinion can be formed: but there seems no reason to doubt that it is much diluted, or weakened in its effects, according to the distance to which it is transported. Thus it has been frequently demonstrated, that fevers have been continued or remittent, of the worst type, in low situations and near the sources of malaria, whilst in places removed from, or elevated above, these sources, fevers were either of a mild remittent or intermittent form, the disease being of a milder grade in exact proportion to the distance and elevation of the place from the source of malaria. Instances in proof of this position are recorded by Sir John Pringle and many other writers, and are of frequent occurrence, during the summer and autumn, in Holland, in Hungary, and in Italy. In the East and West Indies, proofs of this may be daily obtained; and they have constantly presented themselves in the Eastern hemisphere.

As the severity of endemic and epidemic disease appears to be chiefly owing to the concentration and activity of the cause which produces it, relatively to the predisposition, strength, and particular circumstances proper to the patient; so it may be said that, in a general average, the severity of the disease affecting many individuals is to be considered as an index to the concentration or intensity of the causes inducing it; and hence, that the mildness of a disease occurring amongst great numbers of men similarly circumstanced, will indicate a dilution or weakness of the cause whence it springs. From these results, therefore, it is chiefly to be inferred, that the malaria is diluted or weakened as it becomes diffused in the atmosphere, or transported from its source; and that it is so weakened in proportion as the dilution is promoted by the vertical currents induced in the air by means of the sun's rays, the dilution becoming still greater as its admixture in the air is farther facilitated by free ventilation, until its bad effects entirely disappear. It must be evident that this general result—the distance to which malaria may be transported from its source, and yet be productive of disease—will vary much, according to the vicissitudes of temperature, the general character of the season, the prevalence of certain winds, and the absence of others, and most materially as the quantity of vapour

existing in the atmosphere may change, the source of malaria be more or less productive, and the obstacles in its course more or less easy to be surmounted. As a general inference, however, it may be mentioned, that malaria cannot be productive of severe disease at a considerable distance from its source.

It has already been stated that malaria is much obstructed, and in many instances almost entirely intercepted in its passage over woods, closely planted rows of trees, or forests, owing to its being attracted by their foliage; or over rivers, lakes, and inlets of the sea, by its being absorbed by them as it is wafted on their surface. The suburbs and the walls of a city or town also serve to intercept this poison in its passage from its source, as is well known to the physicians in Italy, and to those who have had sufficient experience in a warm climate. Even the buildings of one end of a narrow or crooked street have been known frequently to prove the means of exemption to those of its other extremity from the effects of this substance, owing to their intercepting it, as it were, whilst it is being conveyed by night winds from adjoining swamps or rice fields. Numerous examples of this fact are on record in the works on malaria, and similar instances have frequently come under the observation of those who have enjoyed opportunities of experience within the tropics, or even in the south of Europe. The West India Islands, and many places in the East, particularly Batavia, Seringapatam, &c. furnish numerous examples of the fact. There is even good reason to suppose that the straightening and widening of streets, in towns or cities exposed to the influence of malaria, either from swamps in their vicinity, or from the nature of the soil on which they are built, are unfavourable to the health of their inhabitants; for by these measures, the winds which blow over the adjoining sources of malaria, and become saturated with this poison, have a more ready access to all quarters of a city; and the open streets allow the sun to act upon the soil on which they are built, which, if not well protected by a good pavement, and by drains and sewers, will thereby generate exhalations, which, added to those transported from sources in the vicinity, will materially injure the health of the inhabitants. That this effect was actually known to the ancients, seems apparent from the remark of Tacitus* on the rebuilding of Rome after its destruction by Nero.

* Ex eâ utilitate acceptâ, decorem quoque urbi attulere. Erant tamen qui crederent veterem illam formam salubritatem magis conduxisse, quoniam angustia

SECT. III.—*On the Effects of Malaria upon the Human Constitution.*

The effects of malaria upon the human constitution may be considered to be in proportion to the quantity given out by the soil, to its concentration, to the warmth of the season and climate, and to the humidity of the atmosphere. All these circumstances materially influence the production of malaria: they possess also an additional influence, namely, that of favouring its noxious operation upon the frame, by heightening the susceptibility of the subject. These, along with other causes which dispose the system to this invasion of the marsh effluvium, will come under notice when I come to the various causes which co-operate with it in the production of the diseases depending, either altogether or partly, upon this very efficient agent. At present it will be sufficient to point out those diseases, which, occurring within the tropics may be considered as more or less less the effects of terrestrial exhalations.

With respect to intermittents and remittents, there can be no doubt that malaria is their efficient cause, although other causes may have predisposed the system to their supervention, or may have co-operated with malaria in occasioning them. The severity of these diseases is generally in proportion to the warmth of the climate or season in which they occur; and it has been inferred, with much appearance of accuracy, that the more severe forms of these types of fever are owing to greater concentration or activity, in hot climates and seasons, of the malaria producing them relatively to the susceptibility and other peculiar circumstances of the individual affected. It also appears that, in situations which are evidently productive, owing to their peculiar conditions, of a concentrated kind of effluvium, and particularly if animal matter combine with decayed vegetation in its formation; and if this effluvium is generated in a low, moist, deep, and rich soil, which has been subject to inundations, by a powerful sun, and during a moist, hot and stagnant state of the air—circumstances combining to generate a more concentrated and malignant form of malaria—remittent and continued fevers of a most severe form, of a malignant tendency, and most dangerous as regards their issue, are the result. Even yellow fever, in its worst forms, seems to be the consequence of these

itinerum et altitudo non perindè solis vapore, perrumperentur, ac nunc patulam latitudinem et nulla umbra defensam graviore æstu ardescere.—TACIT. *Ann.* lib. xv. 43.

causes operating, in a state of great activity or concentration, upon highly disposed subjects.

In situations also where the noxious influence of malaria is increased by the free admixture of the miasms proceeding from animal matter in a state of decay, or where the decay of animal or vegetable matter goes on rapidly together, and when they are moreover reinforced by the exhalations elicited from the lower strata of the soil by the action of the sun's rays, then the effects produced upon the human constitution are of the most malignant description. That the worst forms of fever proceed from this cause cannot be denied; for observation has traced their origin thither in almost every instance; and even the plague, when it breaks out in Cairo, seems to depend upon a similar cause for its origin, although others may combine with it for the full production, development, and diffusion of this form of disease. It has been noticed by Prosper Alpinus, and others who have had the best opportunities of observation, that the plague frequently breaks out in Cairo after inundations of the Nile, which have exceeded their usual bounds, and have left a quantity of slime, with vegetable and animal matter in a state of decay, beyond the reach of the drains and canals.

The fever proceeding from marshy effluvia, and from the miasms generated by vegetable and animal matter, assumes various forms or types, according to the particular circumstances in which they originate,—whether conditions of the locality, the nature and concentration of the miasm, the warmth of the climate or season, the state of the air, or the peculiarity and state of predisposition of the individual affected. As these vary, so does the particular character of the disease; and accordingly we have intermittents of various types and grades;—remittents of every degree of severity, and variously characterised; some assuming the bilious character, others the inflammatory; some being both inflammatory and bilious, and others being malignant and quickly fatal, or assuming a typhoid and putrid form towards their close;—continued fevers of every form, grade, and complication, mild in the one case, inflammatory in the other; in this case, marked by excitement at its origin, and soon terminating in depression; in the other case, beginning mildly, but insidiously, and terminating in great local derangement and disorganisation; and in a third instance, marked by great vital depression, which never rallies, by a most offensive and unnatural state of all the secretions and excretions, and a tendency to putrefaction, which rapidly advances the moment that respiration ceases: and lastly, as respects fever, we have intermittents of a severe type run-

ning into remittents, and these latter into the continued form; both the one and the other being pure and uncomplicated in their character, on some occasions and under certain circumstances, and under others variously complicated, every important viscus of the body, in some case or other, becoming more particularly the seat of disease.

Fever, however, is not the only effect produced by malaria upon the human constitution; other diseases of a most formidable description result from the same cause. The next in importance is dysentery. This disease, particularly when it occurs as an endemic or in an epidemic form, results as unequivocally from this cause as any of the types of fever which have been enumerated. When it is met with sporadically, and amongst soldiers, particularly in some situations, both in India and in temperate climates, it doubtless depends more upon the habits and conduct of the individual than upon any other cause. Vicissitudes of season and climate alone, with neglect of the state of the bowels and the immoderate use of spirits or intoxicating drinks, and of unwholesome articles of diet and acid fruits, will of themselves produce certain forms of dysentery. But these are, in warm climates, oftener only the predisposing and determining causes of that more efficient agent now under consideration. In all cases, however, their action very greatly assists its operation; and without which assistance, most probably no disease would have been induced by it. That terrestrial or marsh effluvia are efficient towards the production of dysentery, particularly when this disease is endemic or epidemic, is proved by its prevalence, chiefly or entirely, in situations where, and during seasons when, malaria or vegeto-animal miasms abound. There is not a province in India or its Archipelago that has not furnished instances of this fact. The expeditions to Batavia, and the capture of that colony in 1811, and the more recent expeditions to Ava, have shown it most satisfactorily. Sir John Pringle says that he has observed this disease to prevail in one part of an encampment, and intermittents and remittents in the other parts. Similar facts are recorded with respect to the French armies during their occupation of Italy and Germany, and are well illustrated by M. Vignes, in his work on dysentery.

There is no doubt that the scorbutic form of dysentery, which is well described by Mr. Bampfield, is chiefly dependent upon marshy effluvia, when this cause operates upon individuals imperfectly fed, or fed only upon salted provisions, and, at the same time, so thinly clothed as to allow the vicissitudes of weather, temperature, and season, to have their full effect upon the surface

of the body. The scorbutic dysentery which prevailed at Rangoon, and amongst the soldiers and troops engaged in the expedition to Ava, well illustrates this fact; and the endemic of the Milbank Penitentiary, according to every information which has been published, is also conclusive on the same point.

What the particular circumstances are which occasions marsh effluvia in the one case to produce fever, and in another dysentery, cannot always be precisely known. They are, however, very evident on many occasions, as will presently be shown: in this place it is sufficient to mention imperfect clothing, vicissitudes of temperature and weather, exposure to wet, night air, and cold dews, particularly after great heat or exposure to the sun's rays; whatever suddenly chills the surface of the body; the use of irritating food, of spirits, and unripe fruit, and of impure water, particularly if it be taken from places whence malaria is given off, or if it abound with animalculi or the infusoria, &c.

Besides those diseases, marsh miasmata seem also to be productive of disorders of the large viscera, more particularly the liver and spleen. The influence of this agent, in occasioning diseases of these organs, particularly when it acts conjointly with heat, is evident, although much less so than in the production of fevers and dysenteries; and its operation is much more difficult to explain in the former than in the latter. It is true that many of the instances of diseased liver and spleen, which occur in warm climates are induced consecutively upon intermittents and remittents; but they often occur primarily and endemically, evidently showing their chief dependance upon the exhalations proceeding from the soil. There is seldom seen, within the tropics, a case of disease in which, upon dissection, the liver and spleen are both sound. There seems also to be a tendency to determination to either one or other of these organs, in all cases of fever arising from marsh effluvia; for even in cold and temperate climates the liver or spleen is affected, or becomes so if fever from this source is prolonged; and the local affection is acute in proportion to the warmth of the climate or of the season in which the disorder supervened. From this it may be inferred that the habitual exposure to malaria, even when it fails of inducing fever or dysentery, and more readily if it gives rise to those diseases, will produce disorder of the liver or spleen, or of both. Whether the production of visceral disease in preference to fever depends upon the action of a weaker dose of the marsh poison relatively to the circumstances proper to the constitution of the individual affected by it, or rather upon the diet

and regimen usually adopted whilst exposed to its influence, it may be difficult to decide. It appears more conformable with the result of observation, to account for the circumstance by the latter supposition.

There is one circumstance particularly worthy of attention, namely, the extreme disproportion between the number of those cases of disease which occur from malaria amongst Europeans and the natives of the country. It seems as if the European constitution had an inherent predisposition to be affected by this cause; and that the adaptation of the human frame to climate is especially manifested in the diseases which supervene among its exotic inhabitants comparatively with those which occur among indigenous races. It has long been observed, in countries subject to marsh effluvia, particularly those which enjoy a warm climate, that, even when they do not act sensibly in the production of fevers, or even of any of the diseases I have particularised, they are very inimical to the duration of life in the white variety of the species, particularly in those who are born in the country. Dr. Jackson informs us that white females, born and residing in Lower Georgia, seldom reach the age of 40, and men scarcely ever attain to 50; while those who have arrived at manhood before they settle there, generally reach a good old age. In some places this influence upon the duration of life among white natives of a country abounding with malaria is still more remarkable. In Petersburgh, at Virginia, no white person born there has reached the age of 23. Dr. Jackson saw an individual of 21, who was the only one who had reached that age, and he was quite decrepid and worn down, although he had never been confined by severe sickness. Bruce records similar instances among the white natives of the banks of the Nile, in Abyssinia; and analogous proofs may be adduced from various authors, showing that the malaria of warm climates tends, according to its activity, to limit the extension of, or even entirely to cut off, a native white population, either by producing certain diseases, from some of which the indigenous races are in a great measure exempt, or by stunting their growth, or altogether blighting this variety of our species in their early youth, or in the course of their development, without causing any specific disease.* Individuals belong-

* Children born of white or European parents in India require to be sent to Europe in order to attain due maturity and strength. If allowed to remain in India, they seldom present the appearance of health, even when they arrive at puberty. A greater proportion of them also die before they reach this epoch of existence: and it seems probable that children, whose parents have both been the

ing to the white families of mankind require to be previously brought to their full state of physical perfection, in order to enjoy their usually allotted span of existence, before they are removed to climates where the powerful agent of disease, now under consideration, is in full force.

In addition to the diseases already enumerated as being produced among Europeans by malaria, and in addition to its blighting effects in warm climates upon a native white population, even when it fails of inducing active and specific disorder, its influence in occasioning ulcers of the lower extremities, and foul sores, and even sphacelation and gangrene, must be mentioned. Every military surgeon has numerous opportunities of observing, in the East, the relation which subsists between unwholesome situations and these disorders, both among Europeans and natives. Indeed, it seems to be a general and necessary effect of malaria to diminish the powers of life throughout the whole body; and the phenomena accompanying and indicating this effect are various, according to numerous concurrent circumstances, to predisposing causes, and to concomitant influences.

Among those diseases which may be viewed as the consequence of terrestrial emanations in a more or less marked manner, it may be observed, that cholera, in its severer forms, and in that form more particularly, which has lately ravaged all the countries in the East, is in some measure caused and influenced by this agent. Epizootics or epidemics amongst the lower animals generally prevail during warm seasons, and are more particularly severe towards the close of hot summers and autumns consequent upon heavy rains and inundations, and they frequently appear upon the occurrence of heavy rains immediately following a long hot, and dry summer and autumn; and it is a fact deserving of consideration, that the diseases which become epidemic amongst the lower animals, whether in warm climates or in temperate countries during hot seasons, generally present similar derangements and structural lesions of the internal viscera to those remarked in the human species. This is the case particularly in marshy situations, and in places subject to inundations.

It will naturally be inquired, in what manner does the marshy effluvium affect the human system, and how becomes it productive

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offspring of Europeans, but born and constantly resident in India, would be still weaker, and less likely to arrive at maturity, or to reach the full physical development of the white variety of the species.

of disease? On these topics nothing positive or directly demonstrative can be adduced; inasmuch as the intrinsic nature of this agent has not yet been discovered. But observation has supplied data, which, when calmly considered, seem to show that terrestrial emanations, and all those causes of disease which float in the atmosphere, make an impression on those surfaces with which the air comes in contact: and this impression, when sufficiently strong, or frequently made, is productive of disease, either of the system generally, as in fever, or of some important viscus, as the liver or spleen. It is, therefore, chiefly to the internal surfaces of the lungs and air passages that we are to look as the channels through which malaria makes its hurtful impression upon the animal frame. But whether it acts by deranging the healthy condition of the nervous system of the organ, which derangement produces farther disorder until specific disease is fully formed; or whether the exhalations floating in the air are actually absorbed from the surfaces of the air passages and cells into the blood, vitiating this fluid, and, by its presence there, deranging the whole system, or some important viscus, it is impossible to decide. Both sides of the question have found supporters who have adduced arguments in behalf of their opinion, in the absence of positive proofs. On a subject where sufficient evidence has not been obtained, and where it scarcely can be obtained in the present state of our knowledge, it is almost impossible to come to a decision. As far, however, as circumstances serve either directly or indirectly to elucidate the subject, it seems most probable that the noxious impression of malaria upon the system may be made through the medium of both the nervous system and the blood.

That this agent is destructive to the powers of life admits not of a doubt, although pathologists differ as to the mode in which this effect is brought about. Dr. Cullen supposed it to be a direct sedative, by which the energy of the living system is diminished, and a spasm of the extreme capillaries produced; and that, if the power of the system, or the *vis medcatrix naturæ*, is not entirely overpowered by it, reaction supervenes in order to overcome this spasm, and the febrile action is fully formed. Other pathologists suppose that the marsh-effluvium acts as a stimulant, and that the debility which it obviously occasions, is a state of exhaustion consequent upon previous excitement. Neither of these theories accounts for the whole phenomena, which diseases arising from this cause evince throughout their course, and according to their varying manifestations; although either explains many of the symptoms which are

usually observed. That malaria is destructive to animal bodies, and overturns that vital affinity which exists between their material elements, is shown by the fact of dead animal matter running on faster into putrefaction, in situations where this poison abounds. Nor is its power of destruction limited to animal matter: there is good reason to suppose that its presence is destructive of all organised nature, vegetable as well as animal, the latter most particularly, whenever their vitality sinks so low as not to be capable of withstanding its noxious influence. Whatever influence, therefore, may be imputed to this agent, or in whatever manner it operates its effects upon the living body, there is every proof in favour of considering it as a powerful septic. Thus it may be readily shown that animals killed in a situation abounding in malaria run much more speedily into putrefaction, than in healthy situations; although the temperature, and state of the air as respects moisture and motion, are the same in both; and in many cases this septic operation is evinced by its effects upon injuries, wounds, and sores, even during life. It has also been repeatedly proved, that substances fabricated of silk, wool, and even of cotton and flax, and exposed to marshy exhalations, will rapidly undergo decay; silk and woollen substances becoming putrid; or swarm with maggots and worms; and cotton and linen at first lose their white colour and assume a dingy or yellowish hue, and afterwards are covered by an efflorescence, and soon afterwards their cohesion and organisation are completely destroyed. These effects are generally rapid and complete in proportion to the moisture and warmth of the air; and as the conditions shown to be productive of malaria may be in full force, and its presence consequently more abundant.

Thus far then with respect to the nature and effects of malaria; let us now briefly survey those circumstances which favour its action on the body. All persons exposed to terrestrial exhalations are not equally affected by them; or there are certain conditions which favour their operation on the human frame. These are generally whatever debilitates and increases the susceptibility and excitability of the system,—such as previous disease; previous exposure to excessive heat, and to the direct rays of the sun; great bodily exertion when so exposed, particularly during a close state of the air; poor diet; the use of salted provisions, and of spirituous liquors; want of sleep; excessive evacuations; debauchery, &c. The indirect debility proceeding from the use of stimulating and heating liquors, sauces, and articles of food, frequently predispose the system to the influence of marshy exhalations, and the excite-

ment which they primarily occasion generally creates a disposition to diseases of the liver and spleen, and, in cases where such disposition is already formed, kindles active disease of these viscera.

Excessive indulgence of any of our appetites is always followed by satiety, debility, indolence, and a languid and sometimes an oppressed state of the circulation. At these periods, the nervous influence is as much diminished as the energy of the circulation is oppressed and weakened. Under such circumstances, both the nervous and vascular systems are more easily invaded by those causes of disease which made their immediate impression in these quarters, and are more readily influenced thereby. Impressions, also, made primarily upon the nervous system, are necessarily extended to the vascular system, which in its turn becomes deranged, and thus disorder is extended to all the general tissues and organs of the body to a greater or less extent. But of all the circumstances favouring the impression of morbid causes upon the body, there is none whose influence is more marked than the depressing passions of the mind. This has been evinced on a large scale in many of our campaigns in the East, and in our expeditions for the conquest of colonies within the tropics; and the beneficial effects of hope, excitement, and constant employment, in warding off the impression of the efficient causes of disease, have been fully demonstrated, as well as the baneful consequences of disappointment, anxiety, and the other lowering influences fully shown.

Of the various circumstances favouring the invasion of the causes of diseases, there are few more general in their operation, or influential as respects the resulting effects, whether considered in relation to warm climates, or to temperate countries during hot seasons, than indolence. Inactivity of mind has a most relaxing effect upon the nervous system, exposes it to the impressions of external causes, whilst it leads to inactivity of body; and both combine to generate plethora, diminish secretion and excretion, and thus to derange the functions of the internal organs and to vitiate the whole mass of fluids, and, through them, to disorder all the functions and secretions of the body. Indolence of mind also, and the want of salutary recreations and employments, throws individuals often in the way of many hurtful seductions and indulgences, which otherwise would not have been thought of.

On the other hand, employments and pursuits which interest the mind, and impart a salutary excitement throughout the whole frame, tend in no small degree to ward off the invasion of the usual causes of disease, and to promote all the more important animal functions.

Before concluding these brief remarks, it should be observed, that during sleep the body is more open to the influence of malaria, and, indeed, of all those causes of disease, which, floating in the atmosphere, are received with it into the lungs; and the predisposition is the greater during the sleep which follows great excitement and exertion. Much previous exertion, particularly under exposure to the sun's rays, exhaust the powers of the body; and in this state of exhaustion and of sleep, noxious emanations of every description make a deeper impression upon the system. Experience of this has sufficiently taught the inhabitants of districts adjoining swamps or low marshy situations, in Italy and Greece, to retire at night to the hills and elevated places; for at this period, malaria is more concentrated, and the body, relaxed and overwhelmed by sleep from the fatigues of the day, more disposed to become affected by it. Soldiers and sailors, whose occupations, habit of body, and modes of living, are such as to render them highly disposed to the invasion of marshy exhalations during sleep, seldom are so exposed to them, particularly when on wooding and watering duties, without becoming the subjects of fever or dysentery. Proofs of this are of daily occurrence within the tropics, more particularly in the East and West Indies, and on the coast of Africa; and the danger of sleeping when travelling at night, during the autumn, in any of the unhealthy districts of Italy, is well known to every traveller in that country.

Sect. IV.—*On the Means of preventing the Generation of Marsh-Miasmata, and of counteracting their Effects upon the Human Body.*

In treating of the circumstances productive of malaria, I have already had occasion to refer to several points belonging to this division of the subject; I shall therefore now confine my observations on *the means of preventing the generation of malaria*, chiefly to the advantages resulting,

1st, From *draining* all marshy places where this means can possibly be resorted to. The good effects of draining are too obvious to require illustration. It is only requisite to state, that situations requiring to be drained, will be rendered healthy in proportion to the extent and perfection of the measure, and to the clean state in which the drains are kept. In warm climates, the difficulty of draining is greatly increased, as well as of keeping the drains themselves in due order; yet the benefit resulting from the measure

is obvious. It should, however, be recollected, that marshy grounds, reclaimed by draining, are not altogether exempt from the causes of disease, more particularly in certain seasons; for the drains and ditches themselves cannot always be kept in a state altogether incapable of generating malaria. But disease is greatly diminished by the measure, and the soil is thereby rendered susceptible of cultivation, and subservient to the better support of its inhabitants.

2dly. It is in many places obviously impossible to put draining into practice, owing to their low situations, and to the inundations of rivers or of the sea, to which they are liable. Under such circumstances, *embankments* may be often resorted to with advantage. But the exact conditions requisite to the obtaining of salutary effects from embankments should be considered, and due regard should be paid to the question, whether the embankment will tend to prevent the flowing off of the water after heavy rains, and whether it may not be more injurious in retaining inundations when they occur, than beneficial in preventing them. Every thing in relation to this, will depend upon the exact circumstances of the locality, and the manner in which they are viewed by those who wish to control them.

3dly. In situations where neither draining nor embankments can be resorted to, as in fens, swamps, and bogs, in the depths of valleys and along the banks of rivers, or near æstuaries, then advantage will often be derived from *covering them entirely with water*: for lakes do not exhale miasmata until the mud and soil of their bottoms and sides appear. It has often occurred in various parts of the East, that little disease, and that of a slight intermittent form, was prevalent whilst the sources of malaria were completely inundated; but that as soon as the water was evaporated, and the soil exposed to the sun, covered by slime and vegetable and animal matter, fevers of a severe form made their appearance. Numerous instances of this have been recorded by writers on the diseases of the West Indies. Dr. Rollo mentions, that in St. Lucie the greater part of the regular and mild intermittents appeared during the rains, when the marshes and pools were filled, and that the dangerous fevers made their appearance when the water covering these places was evaporated, leaving a bare and slimy surface to the sun's rays; and precisely similar facts were observed at Seringapatam. The ditch round the ramparts of Geneva was at one time drained, and sickness became prevalent in the vicinity, and continued so until it was again filled. But it is unnecessary to enume-

rate instances illustrating what is already obvious: for water covering the sources of malaria to any considerable depth, has the effect of keeping them from the action of the sun and of the air, and of absorbing whatever of this deleterious substance may be generated.

4thly. *Cutting down woods and forests*, and clearing the soil, so as to subject it to assiduous cultivation is another means of preventing the generation of malaria. Yet, as has already been shown, this means of preventing the generation of marsh poison is often productive of it in a more concentrated form. This is more especially the case within the tropics, in low swampy places near the sea coast. Dr. Rush states, that in Pennsylvania intermittents have increased in severity and frequency since that country has been cleared. Fever was more frequent and severe after clearing Penang in 1801 and 1802; and the same has been remarked with respect to the West Indies and other places of America: so that it may be considered as a general approximation to the truth, that low and marshy situations become still more unhealthy when the trees and woods upon or around them are cut down, unless they are subjected to a careful drainage and cultivation; and even for the first two or three years of such culture, they are at particular seasons productive of disease. As respects, however, clearing woods or forests, covering sloping grounds, dry situations, and the sides of hills, there can be no doubt of the salubrity of the measure, and particularly when these places are afterwards subjected to due cultivation.

The measures which should be taken, after having resorted to those which are calculated to prevent the generation of malaria, are those that tend to confine it to the source that generates it. In many places, neither drainage nor embankments can prevent the formation of terrestrial exhalations. Under these circumstances, it will be found advantageous to cover or surround these sources of disease by tall forest trees, which will confine the exhalations which they generate within their own limits. Where towns or cities are built upon soils and in situations which render them unhealthy, very great advantage will be uniformly derived from making large and deeply situated sewers and drains, which should be well built and arched over, and from attention to paving, and to the constant removal of the mud and filth which accumulate in narrow lanes and streets. It appears also established beyond a doubt, that the narrow winding streets of many of the towns and cities which are built in low situations and in the vicinity of marshes and lagoons, are, especially when the houses are high, actually conducive to

health, inasmuch as the exhalations transported from thence have less ready access to every part of them; and the horizontal currents of the air are interrupted or entirely broken by the first buildings which oppose them. When the streets are narrow and the houses high, provided at the same time that they are always clean and well paved, the sun cannot act upon the soil on which a town is built; for if it at any time shine upon the streets, the period is very short, their narrowness and crookedness, and the height of the houses, being a constant obstacle. The unhealthiness of towns and cities, in warm climates more particularly, arises from the want of those well-constructed drains and common sewers which carry off the exuviæ and filth of the inhabitants. In many towns there is no such provision: the filth and putrid water, loaded with animal and vegetable matter in decay, run down the narrow streets in sluggish rivulets, or stagnate before the houses of those who deservedly suffer from it; and the grosser parts are often gathered into heaps, until washed away by a kind Providence, who provides, in the immensity of its works, and in the storms which seem to threaten his immediate existence, against the indolence and ignorance of man.

When accumulations of filth are formed upon the surface of unpaved streets, or upon ground in their vicinity, the more fluid parts slowly sink into and mix with the soil, while the gaseous products which are formed vitiate the atmosphere. These latter are direct sources of disease, which are reinforced and rendered still more noxious by the exhalations proceeding from the soil itself, enriched and made fertile of such products by the fluid filth,—the animal solutions which are continually being poured into it. But not only are the streets and lanes of towns in warm climates, lying low and unprovided with common sewers and other sources of cleanliness, loaded with filth, but even the more concealed places, as the woods, groves, and jungles, for a considerable distance around them, are mires of corruption, and the receptacles of ordure, and animal and vegetable exuviæ and remains; thus furnishing additional materials for the generation of noxious effluvia to places which already abound with them.

The healthiness of the inhabitants of any country depends much upon their choice of situations for their habitations. Care should be taken in warm climates, more especially where the winds generally blow from particular quarters, at certain seasons and hours of the day, to erect the buildings, or to form encampments, or even to take up a temporary abode, to windward of marshes, or of those sources of disease which I have just described. This precaution

cannot be adopted so efficaciously in northern and temperate climates as in intertropical countries, owing to the variableness of the winds in the former; but yet, in many of the latter it may be attended to in various particulars, more than is usually the case. When necessity compels a temporary residence to leeward of a swamp, then advantage will be obtained from lighting fires between the place of residence and the source of disease; and much benefit will be derived from having double-walled tents, within which fine musqueto-curtains may also be used. Houses and buildings, either standing near or to leeward of any source of malaria, should be perfectly shut on the side towards those places: if they are actually built upon an unhealthy situation, the ground floor should be left entirely unoccupied, and should be so open on every side as to allow complete perflation.

From the information furnished us by Dr. Copland and the late Mr. Alcock, respecting the effects of the chlorurets of lime and of soda, in destroying noxious emanations, it is probable that the manufacture and use of them in India and in other countries within the tropics would be extremely advantageous. Dr. Copland found a small quantity of the solution of the chloruret of the oxyde of lime sufficient to remove the disagreeable odour proceeding from sewers, in every instance; and doubtless the same agent might be most advantageously employed in many instances to destroy the emanations from those places within the tropics which are more remarkably unhealthy, particularly in large towns, and when the emanations proceed from foul drains, sewers, and ditches, &c.

Of the prophylactic Means which may be resorted to by Persons who are necessarily exposed to the Influence of Malaria. —Medicines, particularly such as tend to promote the secretions and excretions, without materially lowering the vital forces, may be taken frequently with advantage. A costive state of the bowels should always be prevented, by means which correct and regulate the state of the biliary and intestinal secretions, at the same time that they assist the abdominal viscera in circulating and discharging their contents, whenever their functions are torpid. For this purpose, a few grains of blue pill with the pilula aloës cum myrrhâ may be taken at bed-time, and a bitter aperient draught in the morning, consisting of equal parts of an infusion of senna and gentian.

The diet of individuals exposed to malaria should be nourishing, but not heating. Animal food should be taken sparingly, and spirituous liquors and strong wines ought to be entirely avoided. The

lighter and thinner wines may be resorted to in moderation; but excess even in them should be shunned. Exercise should always be taken in the cool of the morning and evening; and it should be regular, neither so much as to fatigue and exhaust the system, nor so little as to occasion a languid and imperfect performance of the internal functions and secretions.

When the exposure to the influence of malaria, either at night or in the morning, is great, and at all to be dreaded, a moderate dose of bark, or of the sulphate of quinine, with a little powdered ginger or cayenne pepper, may be taken previously to such exposure: a fire should be lighted during the night in the apartment or in the vicinity of the spot of residence; and care be taken that the raw night air should be excluded as much as possible, by means of curtains or tent cloths, and by closing the inlets of air in the direction of the sources of malaria. On occasions of this description, the use of cigars or the hookah is often serviceable; but it should be indulged in only occasionally, and only as a prophylactic measure.

On all occasions the tenour of the mind should be properly regulated. The depressing passions ought to be avoided on the one hand, and all undue excitement of the spirits, as liable to be followed by depression, should not be indulged in on the other. A calm, confident, and well-employed mind, moderately occupied and interested in the objects of its pursuit,—unruffled by vicissitudes of temper, and undisturbed by inordinate indulgence of its desires,—with a moderate but sufficient gratification of its wants or wishes to give a foretaste of more perfect fruition, and to leave still more to hope for and to aspire after, so that its capacity of gratification be not exhausted, or its means of enjoyment diminished,—is, upon the whole, that state of mind which most successfully opposes the causes of disease which have been treated of in the foregoing pages, and which, assisted by the sensual indulgences of some, the ill-regulated passions and dispositions of others, and the neglect and carelessness of many, prove so destructive to European constitutions and to life itself in intertropical regions.

SECT. V.—*On the Climate and usual Course of the Seasons in the British Possessions in the East, &c., especially of the Presidency of Madras.*

From the preceding view of the sources of malaria, I proceed to consider the climate of India in general, and that of the Madras Presidency in particular; to view it in relation to the seasons, and

the peculiarities which they present in those particular places and districts which have fallen under my own observation.

Before, however, entering upon a consideration of the climate and seasons which prevail at Madras, it may be proper to notice the extent of territory under the government which extends from Cape Comorin, south, to the river Taptee, north, and from Seedusaghun on the Malabar coast, west, to Ganjam, east, in the bay of Bengal. The territory exclusively belonging to the Madras government in 1834, covers an area of 133,756 square miles, and contains a population of 16,917,361 souls. The country is divided into the following divisions of the army: 1. Centre division. 2. Southern division. 3. Northern division. 4. Malabar and Canara. 5. Ceded districts. In addition to these there are subsidiary forces, namely, Mysore, Hyderabad, and Nagpoor. The army is distributed in these different divisions; and it is therefore necessary separately to explain the peculiar localities, seasons, and climate of each, which may be likely to influence the health of the troops. The presidency of Madras is influenced by the N. E. and S.W. monsoons; and the usual course of seasons may be divided into hot, cold, and rainy. The N. E. monsoon generally commences in October and terminates in December. From December to the end of February, the N. E. wind prevails, and the weather is cool and delightful. In March the wind changes to the southward, and the weather is hot, moist, and relaxing. In April it becomes extremely hot, and the heat continues to increase during May and June, when the hot winds set in from the westward, and this continues till July and August, when the air is relieved by occasional rains. September is a close hot month, and the rains commence in October and continue until December.

Centre Division.—This extends from the Khistna river, in lat. 16° to Porto Novo, in lat. 11° north. It is a flat open country, spreading from the sea coast inland to a range of mountains called the Eastern Ghauts, near Arcot and Vellore, and includes a space of from 60 to 80 miles. The military stations are Madras, the Mount, Poonamalee, Arnee, Wallajahbad, Arcot, and Vellore. The soil consists of sand and loam, sparingly intermixed with the remains of marine testaceous animals. The inland parts of this district contain hills of syenite, with a small proportion of felspar; the whole soil appearing to consist of the débris of decomposed syenitic mountains, and according to local circumstances, it is either a loam mixed with sand and gravel, and strongly impregnated with iron; or, in low and wet places, a stiff red loam mixed with vegetable earth and

fine sand; on eminences it is generally sand and gravel. It is also in some places impregnated with common salt, which in dry weather presents a saline efflorescence on the surface. Near Madras the soil is a heavy sterile loam and sandy surface with high and low grounds: on the former various kinds of grain are cultivated, on the latter rice; and in all parts of the country removed from rivers, there are tanks of large dimensions, maintained by the government, for the purposes of irrigation. St. Thomas's Mount, about nine miles from Madras, is a hill of very small extent, and the cantonment of the artillery. There are no other hills in its neighbourhood except those of Palaveram, where there is a native cantonment about two miles from the mount. Those are well known land-marks on approaching the Madras roads, and are about 400 feet above the level of the sea; they are composed of primitive granite overlaid by hornblend slate passing into hornblend rock. In this rock the variety of the proportions of the minerals composing it is endless: in some the strata of hornblend only is seen, in others felspar and quartz, and in others simple quartz, which last occasionally intersects the strata at all angles, and in different directions in very thick veins. The large masses of hornblend rock on the summits, or on the sides of these hills, contain very little felspar; and having the appearance of being unstratified, the hornblend being foliated, shining, and nearly black, is in fact the primitive green stone found all over India; its fracture is splintery and the texture like that of all green stones, very tough and compact. I must not, however, omit to mention, as one of the geological characters of this locality, a rock which extends nearly over the whole of the plain, overlaying in many places the granite; that is, the conglomerate laterite which is observed in two different conditions, namely, that of undisintegrated, and that of detritus.

The conglomerate laterite is seen in its entire state on the banks of the Adyar river. The detritus from this rock has two geological positions: the one as loose rounded pebbles scattered all over the surface of the plain, the other as a substratum to the soil. This last is sometimes many feet thick, embedding occasionally undecomposed pieces of the compact conglomerate laterite, which proves that the detritus is derived from the present conglomerate. In more than one locality of this plain a stratum of nodular kankar is found between the lateritic detritus and the granite. In some of these places it is like earthy friable tufa, having pieces of granite imbedded in it. Trap is not unfrequently met with either in loose blocks or in dykes, apparently of considerable dimensions. These

last are to be seen between Palaveram and Trivatoore, where they are nearly level with the soil, or forming small swellings in the ground. Having thus briefly noticed the geology of the plain of Madras, I shall now speak of its climate, as influencing health.

Madras is the seat of government, and contains a population of about 500,000 inhabitants—independent of its military garrison, and European population. In the fort are all the public offices, the staff of the garrison, and one or two European regiments. The native regiments have barracks outside the fort about two or three miles distant. The members of council and public servants of government, and a large proportion of the European population, reside in garden-houses spread over the plain to the extent of several miles. These gardens are surrounded by hedges of the aloe and prickly pear, and there are a considerable number of fruit trees, mango trees, cocoa-nut trees, &c., which are allowed sometimes to grow to such an extent as utterly to exclude the sea breeze,—a source of considerable distress to the inhabitants; and, although Madras is considered one of the most salubrious stations under the presidency, these causes have at different times led to the belief that the health of the inhabitants was seriously affected by the interruption of a free circulation of air from over-grown hedges, and a too general plantation of trees.

There can be no doubt that any interruption given to the free circulation of air by the too general plantation of trees, over-grown hedges, or any other cause, may be productive of considerable mischief to health. It therefore becomes a matter of importance to notice the subject in order to illustrate more clearly its relative bearings. In the first place, I shall endeavour to consider the effects of mere heat on the human constitution in woody and unperflated districts; and, secondly, endeavour to show its effects upon the constitution, from that damp and non-electric state of atmosphere peculiar to such districts during and after heavy falls of rain.

That mere heat, whether the country be unperflated or quite open to the breeze, may be productive of disease, such as hepatitis, cholera morbus, &c., cannot be denied; and as all experienced medical men will admit its power to aggravate many of the most serious symptoms of disease, I think it fair to infer, that any interruption caused to the free circulation of the *sea breeze* in particular, must be regarded as an evil of considerable magnitude.

I have often seen patients oppressed by mere heat alone, labouring under general languor and debility, pant for the sea breeze in certain houses on Choultry Plain, while other gardens more favour-

ably situated are enjoying it; and I have often been obliged to order my patients away from the comforts of their own house to any accommodation procurable at St. Thomé, or Ennore, merely to obtain the renovating influence of the sea breeze, which has been shut out from them by the interference of close plantations of trees, and high and impenetrable hedges.

I have, indeed, reason to believe that persons under extreme debility have unhappily fallen victims to the influence of mere heat during the continuance of the land winds, who might have been saved by a more complete and free circulation of the sea breeze among the gardens of Choultry Plain.

I now come to the supposed effects of that damp and non-electric state of the atmosphere peculiar to wooded districts, during and after considerable falls of rain. The native inhabitants of Madras in general are subject, in the rainy seasons, to intermittent fevers and fluxes; but, except to medical men, it is not well known, that a fever of the remittent type, frequently attended by diarrhœa, and sometimes followed by chronic visceral obstructions, particularly of the mesenteric glands, is often *endemic* in the months of December and January, after copious monsoons. Intermittent fever and dysentery are certainly often owing to the quantity of rain alone; but according to my experience, the remittent and diarrhœa above alluded to, generally prevails among the crowded inhabitants of those largely wooded gardens occupied by the Musselmans of rank in the neighbourhood of St. Thomé, Triplicane, &c.; more especially when their followers were much more numerous than they are at present. And it is not improbable that the cause of this may be referred to a damp and stagnant atmosphere in those peculiar localities, rendered more unwholesome by the effluvia proceeding from putrid animal and vegetable substances.

Such, it is presumed, are the effects usually attendant upon this state of atmosphere, and that they are not more deleterious immediately after our heavy monsoons, may be attributed to the very dry and sandy soil peculiar to Madras.

But in enumerating the bad effects, arising from an over luxuriant vegetation about this settlement, it must not be understood that I would recommend the entire removal of either hedges or trees, for in many instances they are essential; they should be kept in a well regulated state, and not be allowed to become exuberant.

Trees are objects not only of natural beauty, but they possess other most useful advantages. The cool shade which they afford to men and animals cannot be dispensed with in this country; the

shelter which they give to our houses during the prevalence of the long shore and land winds, when volumes of sand are circulating through the atmosphere, is felt and acknowledged by every resident at Madras.

The usual course of the seasons in the Carnatic is as follows:— After the violence of the N.E. monsoon is over in December, and the Peninsula being cooled, the breeze from the sea is in general early, the temperature of the sea and land being then so equal that the sun's influence causing a temporary inequality, is sufficient to produce it. This agreeable weather lasts to about the end of February. In March the long shore or south winds commence, and continue till April. This wind, from blowing along the coast, is very moist, and is considered the most disagreeable relaxing wind that blows. The trees and shelter are then of use in robbing it of its moisture; and it is at this season the trees are most vigorous, and come generally into flower. In the month of May the land winds or great S. W. monsoon of India, cooling all Hindostan, with the exception I believe, of the Coromandel coast, generally commences. This may be by the heated state of the extensive surrounding countries; but as far as regards the Carnatic, the heated state of Mysore, over which it blows, finding a still more extensive and heated country below the Ghauts, it blows with more violence, increasing in heat and dryness, and with increased or diminished velocity, across the Peninsula. As the surface is more or less heated, the greatest deposition of rain on the commencement of this wind is on the Malabar coast and Western Ghauts, the heavy rains extending very little beyond this range of mountainous country; so that in the greatest part of Mysore to the eastward of these mountains it does not, I believe, produce much heavy rain. In Mysore, during May, the weather, though hot, is pleasant; but on descending the eastern Ghauts into the Carnatic, there is an immediate increase of about fifteen degrees of Fahrenheit. During this wind the shade of trees is much prized, and necessary for the health of the inhabitants, and, in many parts of the Carnatic, very much wanted: during this period there is very little benefit from the sea breeze, the land wind being so strong as to prevent any breeze from the sea. This wind is reckoned healthy, and a great purifier of the atmosphere, evaporating and dissipating all putrid and offensive matter but much exposure to it is dangerous. It is this wind burning, as it were, every thing hurtful, with the ventilation from the sea, that renders the coast of Coromandel so healthy. In June there is generally, though not always, an abatement of the heat and violence of the

land winds from rain about the Eastern Ghauts, with cloudy weather and occasional showers in the Carnatic. In July it is farther abated from more frequent showers then expected, to be sufficient to enable the land to be ploughed, which in the month of May was baked to the hardness of stone. Sea breezes now become more regular, always, however, depending upon the temperature of the land. It is in the month of July, August, and September, when the temperature of the inland country has been diminished by occasional showers, and that the sun's influence is diminished or counteracted by winds from the land or the land's temperature, that the greatest distress is felt from the close, sultry weather. In October the monsoon generally commences and continues till the 15th of December.

According to the tables calculated from the returns made to the the Medical Board*, the prevailing diseases are fever, dysentery, and hepatitis. The average annual per-centage of sickness in the Presidency division of the Madras army, for the period of six years for which the tables are made out, was 217 per cent. in the European, and 70 per cent. in the native forces. Of the 217 per-centage of sickness,&c. amongst the Europeans, 30 per cent. were fevers, 47 per cent. dysentery, and 26 per cent. hepatitis. Of the 70 per cent. in the natives, 16 per cent. were fevers, 2 per cent. dysentery, and $\frac{2}{10}$ per cent. hepatitis. The proportion of deaths amongst Europeans was 9 per cent. in the effective strength, and 2 per cent. in the natives. The greater prevalence of hepatitis and dysentery amongst the European troops in the Madras than in the Bengal presidency, seems, in some degree, to be owing to the greater warmth of the climate, and to the excessive use of deleterious and intoxicating liquors. The per-centage of fever, dysentery, and hepatitis, is in some degree increased at the Presidency, by the number of cases removed there from other stations, either for change of air, for the purpose of being invalided, or in order to embark for Europe.

Arcot is in lat. 12° 52′ N., and long. 79° 29′ E. It is an open cantonment for cavalry, about eighty miles west of Madras, fronting the south, and situated on high ground sloping to the left bank of the Pallam river about 900 yards distant. The country around is open but irregular, and its geological character very similar to that already mentioned. Near the cantonment, both on the S. E. and S. W. there are considerable tracts of low rice ground running parallel with the river, and which are irrigated from it by means of artificial canals; besides these there are in the vicinity smaller

* See Sketches of the Diseases of India.

patches of rice ground, watered from tanks. There are some trees in the cantonment, but few in the country around, with the exception of an extensive strip which commences about half a mile S. W. of the cantonment, and runs about one mile along the bank of the river, having a breadth of about 400 yards thickly planted with mango, tamarind, date, guava, and a great variety of other trees, and called the "Nine Lac Garden," from the number it is said to contain. There is no jungle within several miles; and, with the exception of a few inconsiderable rocky bare elevations, about two miles distant, there are no hills in its vicinity. The water is good, but in the dry season it becomes scarce in the wells and tanks, and it is necessary to have recourse to pits formed in the bed of the river. There are lines for three regiments of cavalry, and an extensive barrack for a European regiment of cavalry surrounded by a high wall.

Arcot is considered a very hot station, but it has always been very healthy, and there is nothing apparently objectionable in its locality, except that part of the Pettah and some of the officers' bungalows are rather low and confined, by having too many trees about them. There is also on the east flank of the cantonment a low spot which in the rainy season is a water-course, but in the dry one becomes stagnant, which gives out unpleasant effluvia; but it does not appear to have been productive of disease.

Vellore.—The fort of Vellore is in lat. 12° 55′, and long. 79° 13′ E., and situated at the foot of a high range of bare rocky hills, which run in a line north and south, and form the eastern boundary of what is called the Amboor Valley. The fort is not large, but it contains hospitals, barracks for a European regiment, magazines, quarters for officers, and large spacious buildings occupied by the families of the late Tippoo Sultan and the King of Candia. The ramparts are high and broad; the ditch is of considerable breadth, and there is always a good depth of water: it is generally clear from grass and weeds, and occupied by alligators, some of a very large size. The pettah, or town of Vellore, runs between the fort and the above range of hills; it is clean and airy, and the space taking the pettah, between the fort and the hills, is not more than a mile. The soil is a dark brown mould, producing a constant succession of luxuriant crops, of which rice and tobacco form the largest proportion: the water is good and abundant, and procured not only from numerous wells and the Pallar river, which passes within three quarters of a mile of the fort, but from numerous springs which issue out from the foot of the contiguous range of hills.

There is a considerable number of trees in and about the Pettah, which are, perhaps, too numerous for a spot so little raised above the contiguous rice fields; but although they must tend to obstruct a free circulation of air, which is already sufficiently impeded on one side by the high range of hills, at the foot of which Vellore is situated, they do not appear to be productive of any pernicious effects, for I believe no station, in point of salubrity, surpasses Vellore.

Arnee was formerly a fortified town, but in latter years the fort has been dismantled. The barrack-hospital and other public buildings are still remaining, and it is the station for a European regiment. It lays in lat. 12° 46′ N., and long. 70° 23′ E.; distance S.W. from Madras about 74 miles. Arnee is about 400 feet above the level of the sea, and somewhat higher than the comparatively low country by which it is surrounded in every direction. The soil within a circuit from five to seven miles round Arnee is similar to that already described. In some places, however, a very rich loam is met with, while in other places a pure clay, whence the natives of the country carry on a considerable local manufacture of bricks, tiles, and the usual Indian domestic pottery. The numerous artificial lakes or tanks by which Arnee is surrounded, afford abundance of water for constant irrigation; and I have seen three crops of rice raised in one year. The population is numerous, and the consequent abundance of manual labour, added to a good system of manuring the land, have combined to render this part of the country highly productive. There are no jungles of any importance near Arnee, but there are some high mountains at no great distance. About eight miles west of the fort there is a range of hills which stretch north and south to the distance of 50 miles, *i. e.* from the low rocky hills near Arcot, to the high rocky precipice of the fort of Gingee. The formation of this range is similar to those already described, namely, primitive granite and syenite, with all the varieties and combinations belonging to that formation. Fever prevails in the neighbourhood of this range, particularly at Gingee, and that conical peak which overlooks the pass from Arnee to Vellore; but it does not appear that this influence extends to Arnee, which so far as climate is concerned, must be considered a healthy station. The general temperature is rather high, ranging from 80° to 97°, and sometimes to 104°, but is relieved by frequent showers. Here provisions are plentiful and good.

Cuddalore.—The old town of Cuddalore is in lat. 11° 44′ N., long. 79° 52′ E., situated at the junction of two rivers as they enter the

sea, from which it is separated by a branch of one of them, and a spot of land about 300 yards broad. About half a mile to the north of this town, and close to the banks of the Pannaur river, are the ruins of Fort St. David; and about one mile inland is what is called by Europeans *The New Town*, but by the natives Manji Coupem.

Cuddalore, is the general depôt of European Pensioners who reside there with their families. The houses are neatly built and laid out in regular streets, lined with trees. There are no public buildings except an old church and a very extensive up-stair house erected in former times for a factory, and which is now converted into a court house, and one of its towers a gaol, where civil prisoners are confined.

The site of Cuddalore is flat, particularly the old town which appears to be very few feet above the level of the sea; and from its vicinity to two rivers as already stated, there is a great deal of water about it. In the New Town garden-houses there are a good many trees, and the roads are lined by majestic banyans. The country around Cuddalore is generally open, there being no jungle of any importance near it, and there are no hills within many miles. From the low situation of this station, and the quantity of water, it might be considered unhealthy; but this is not the case: for both the native population and the Europeans enjoy a remarkable immunity from disease, while the New Town and Fort St. David are proverbially healthy.

Southern Division.—This extends from Porto Novo to Cape Comorin, and includes that space between the eastern range of Ghauts and the sea. The following are the principal military stations: Trichinopoly, Dindigul, Madura, and Palamcottah. Negapatam, Coimbatore, and Salem, are civil stations. The Neilgherry Hills are included in this division.

Trichinopoly is the principal station, situated on the right bank of the Cavery River, in lat. 10° 50′ N., and long. 78° 44′ E., about 207 miles S.W. of Madras, and distant from the sea about eighty-five miles, Negapatam being the nearest point to the coast. The district of Trichinopoly includes an area of about 2170 square miles, and is bounded on the S.E. by the Coleroon River, on the south partly by the Rajah Tondiman's country, and partly by the district of Madura; on the west by Coimbatore, on the north-west by Salem, and on the north-east by South Arcot.

The climate of Trichinopoly is as healthy as any other part of the Carnatic, though it has been considered too hot and relaxing for

Europeans; a high temperature, cloudless sky, a dry atmosphere with much glare, are its predominating features, for at least eight months in the year. This condition of the air is often interrupted by gusty high wind, frequent pishashes, suffocating clouds of sand and dust, which makes the heat more oppressive and disagreeable. The remaining four months of the year are rendered more agreeable by the cloudy state of the atmosphere, a more moderate temperature, and frequent showers of rain. The hottest period of the year comprises the months of March, April, May, June, and July, and is found the most trying season to the European constitution. Thunder showers and vivid lightning are then very common, but no diminution of the oppressive heat is thereby effected; the heat is also close and oppressive during these months from 9 A.M. to 4 P.M. and not unfrequently continues unabated throughout the day and night. The months of August, September and October, are cooler than the preceding five months of the year; the heat being moderated by strong westerly winds, and by heavy falls of rain. The weather for the following four months becomes delightfully cool and balmy, the sun's power being weakened by a cloudy atmosphere, and the earth's surface cooled by frequent falls of rain. Fogs and dews are seldom formed, and are only noticed in the cold season; the air is seldom damp; the changes are neither frequent nor sudden; and to this equality may be attributed its healthiness.

Heavy falls of rain produce very improving influence in the climate. Vegetation, which was altogether suspended in the very hot season, soon becomes rapidly luxuriant and vigorous, and the climate is made more congenial to animal existence. The temperature in 1834 was, from March to October, between 91° and 97°, and from November to February, 83° to 87°; in 1835, from March to September, 91° to 96°, and from October to February, 80° to 88°. The annual fall of rain is from 30 to 40 inches, but often less. A large portion of the soil is under wet cultivation, and produces two crops in the year, in situations where water for irrigation cannot be procured. Crops of dry grain, dependent upon rain, are cultivated. Tobacco is grown in large quantities throughout this division, and there are good gardens producing excellent fruit, such as grapes, mangoes, pine-apples, &c.

The soil on all the high places around Trichinopoly is rocky and barren, being hard and gravelly, absorbing very little if any moisture. On the low ground, however, and near the banks of the river, the soil is alluvial of a good depth, and very productive. The rocks are granite, and stratified in broad tabular masses, with

rounded summits rising into gentle undulations above the surface, all over the plain, and disposed in large detached masses; the strata or layers of the rock having generally a dip and declination to the S.W. by W., or N.W., at angles varying from 25° to 30°, and seldom rising to a great height above the level of the country. There are, however, large beds of stratified rock immediately to the S.W. of the cantonment, between the European and artillery barracks, where solitary cells are built. There are also, besides the great rock of Trichinopoly, several other large rocks in the neighbourhood of similar character and appearance, rising abruptly in large unshapen and broken fragments of considerable height. These rocks, which are abundant, are of good quality, and used extensively for building.

The population of the fort and cantonment, is about 62,000 souls. The influence of a tropical climate on Europeans, is very debilitating, and its effects are sooner perceived on young men who arrive before their full strength and vigour are developed—over excitement, followed by exhaustion of body and mind, is soon produced, and thus a host of diseases engendered. To an atmospherical origin we can satisfactorily trace febrile and inflammatory disorders, and others too of a less acute character. The transitions from hot to cold weather may excite inflammations of internal parts; while external phlegmasiæ more generally follow from an opposite condition of the air. Febrile action is found to follow the exhaustion consequent on continued heat, as well as to be produced by the combined agency of wet and cold. Fever and dysentery are the chief diseases of this station; the former depending upon climate, the latter on intemperance; which, perhaps, is one of the most productive causes of disease in India.

Dindigul, the capital of the district of the same name, is a strong fortress built upon a high granite rock; it stands unconnected with any other, and rises abruptly from the plain about 280 feet, the surrounding country being about 700 feet above the level of the sea; while the site of the town itself is considerably lower: it lays in lat. 10° 22′ N., and long. 75° 5′ E. This province is a long and narrow valley, and commences about 18 miles N.E. of the fort, over a small range of hills which runs in a S.S.W. direction to the head of the valley; the extreme length of which is about 80 miles, and its greatest breadth about 70, the whole comprising a superficial area of 4300 square miles, of which 200 are occupied by hills and mountains, woods and jungles. The remainder exhibits a vast champaigne of fertilized fields of dry grain

and rice grounds, interspersed with a variety of villages; rows of trees and tanks of water. Grain and garden vegetables grow in high perfection; but *fruits* and *roots* are reared with difficulty, and are neither so good of their kind, nor met with in such quantity as are to be found in other parts of the country. There are five rivers which run through this district, the principal of which is the Vayaroo; they take their rise in the high range of hills to the west. The chief towns are Dindigul, Pylne, Pericallam, Taggamally, and Nella Cottah. The population is about 264,990 souls.

It will be unnecessary to enter into the geographical boundaries of this valley, farther than as the various range of mountains may influence the climate; and the most remarkable of these are the Veragherries, on the west; a very extensive range, and in many parts upwards of 7000 feet above the level of the sea, extending towards the south and west from Travancore to Daraporam. In many parts of these hills fever is very common, particularly in the low jungly part of them; but on the loftier parts of them, which is a table land, and very accessible, there is a perpetual verdure and a temperate state of atmosphere, hardly attainable in the most favoured climes. Raspberries, violets, white roses, and wild thyme are found growing in profusion; and although these hills, like the Neilgherries, would afford an excellent retreat to European invalids during the very hot part of the season, it does not appear that they have as yet been much resorted to. The north-eastern boundary of this valley is the Manapar hills; and the south-eastern is the Seroomalla range, which separates Dindigul from Madura; while the eastward of the valley is open to the sea. The lower fort stands on the eastern side of the rock, surrounded by a deep dry ditch. There are two large tanks, one containing brackish water, is fed by springs, and does not dry up in the hot weather; the other, which depends upon the rain for its supply, contains good and wholesome water; but, with the exception of a few springs, it becomes dry in the hot season. In the upper fort there is a natural reservoir of excellent water. The pettah, or town, is situated east of the fort, and is about 1066 yards long, and about 860 yards broad; there is not a trace of the old wall. The space between the fort and pettah is the parade—a large and wide street leading from the main street to the south, forms the bazaar. The lines of the regiment are situated to the N. E. of the lower fort, and to the south of the street leading from the northern entrance. The streets are wide, kept in good order, and sufficiently shaded by trees, with a perfect and free ventilation. The houses

are good, some tiled, others thatched, and the site of the whole is on ground sufficiently elevated in all respects for the purposes of health. The lines of the pensioners resident at Dindigul extend along the road which connects the roads from Trichinopoly and Caroor, running directly east and west. These lines consist of good thatched houses, and are kept in very neat order. A small water-course which runs along the south side of the road, leading from the eastern entrance, passes under two small bridges on the north side of the road, and S. E. of the pagoda, which is situated about the centre of the main street on its northern side; it there runs by the western wall of the same, and receives the surplus waters of a piece of marshy ground at the west end of the town, afterwards conducted into the Typakallum Tank below the rock on its north side; it is, however, only useful during the rains, or occasional heavy showers which often take place—at other times it becomes choked up with filth. The soil in the immediate vicinity of Dindigul is either a rich red silicious and argillaceous earth of three or four feet deep, laying upon gneiss rock, or a light red earth, over which stones are abundantly scattered; the latter predominates, and is favourable to the growth of castor oil and dry grain. The quantity of rice ground is very limited, and quite inadequate to the consumption of the inhabitants, who depend on a supply from the neighbouring country. In seasons of scarcity it is imported from Trichinopoly, Caroor, and Paulghaut Cherry.

The winds, generally speaking, correspond with those in other parts of the Peninsula; and this district, from its central situation, receives a supply of rain not only from both monsoons, but, from its vicinity to the mountains, it receives irregular supplies of water from the showers which accompany the frequent thunder storms that occur, and give purity and freshness to the atmosphere. In April and May it is very hot, both day and night; though not perhaps so hot as at Madura and Trichinopoly. Thunder storms, heavy rains, and winds, are frequent;—bilious complaints prevail at this time. In June and July the heat during the day is excessive, but the nights are more cool—the wind is from the S. W.; but sometimes from the S. E. misty clouds are observed on the mountain tops to the south and west, the contents of which sometimes reach the valley, while the mountain breezes cool the air. August and September are still more cool; the wind is from the S. W. during the most part, but towards the end of September it becomes variable, veering round to the north. In October and November the N. E. monsoon commences, and the principal fall of rain takes place; but it is not

so great at Dindigul as at many other places farther north, and nearer to the coast. These eight months are considered healthy. During December and January the dews are heavy, and rain falls in the early part of December. In February and March the winds are cold, and the dews are also heavy; and these months are considered by the natives as the most unhealthy months in the year, when catarrhal and pulmonary complaints are most common. The thermometer during the year is seldom higher than 98°, or lower than 56°.

The climate of Dindigul has generally been considered one of the most salubrious in the country; but, in the year 1810, a most malignant epidemic fever raged generally throughout all the southern provinces, and occasioned great mortality; to such a degree, indeed, that Dindigul ceased to be a military station from that time to 1813, since which time a native regiment has usually been stationed there. The endemic of the country is fever, of so very irregular a type that it is difficult to classify it, as it partakes of all types, remittent, intermittent, and continued, but is easily checked if attended to in time, and treated with evacuents in the first instance, and afterwards by the quinine, which will be spoken of hereafter. Guinea worm is common in hot weather, and foul ulcers on the legs and feet in the wet weather. Ophthalmia is also a common disease in this country, during July and August, and small-pox is not uncommon; but syphilis is very rare.

It does not appear that the district has been visited by any very fatal epidemic since 1810, till the year 1833 and 1834, when sickness and mortality increased to a greater extent than in the preceding years; but by no means equal to that which occurred in 1810, 1811, &c. This was supposed to arise not only from peculiar seasons, but from dearth and famine; and the fatal diseases during this period, were from cholera, fever, and small-pox: the first of these have been particularly striking in 1833—no less than 5585 of the inhabitants, or about half of the total number of souls, were attacked with cholera, more than one-half of whom died. In 1834 the number assailed with it was only 2518, or about $\frac{1}{25}$ths of the whole sick, of which rather less than half died. The fevers amounted to 4762, of which rather more than one-fifth died. In 1834 the number did not exceed 4593, of which upwards of one-fourth proved fatal. With regard to the small-pox, it is deserving of remark that this malady was more prevalent in 1834 than in 1833: in the former year not less were attacked than 3230 and one-third died; while in the latter the number attacked only amounted to 2074, of which one-fifth died. On contrasting the

ravages of small-pox and cholera, it will be seen that the latter has been much more prevalent and fatal. Dindigul possesses much natural beauty, and as a station (except under the particular circumstances already noticed) was always considered remarkably healthy.

Madura.—The fort or city of Madura is about 31¼ miles in circumference, situated in lat. 9° 52′ N., and long. 78° 8′ E. on the south bank of the river Vayarao, nearly equi-distant about 70 miles from the western range of mountains and the sea, and partakes of both monsoons, but more of the N.E. than the S.W.; its population is between 25,000 and 28,000 inhabitants. The site is low, compared with the adjoining country, and surrounded by a ditch, which, with several tanks in the fort, are filled from the river; and there are in the immediate vicinity of the fort large tanks, and rice fields supplied with water also from the river.

The climate of the province of Madura differs from that of Dindigul only in being more open and not so mountainous, though there are mountains at no very considerable distance, and some marshy tracts and jungle, which must have some influence on the climate; on the whole, however, the province of Madura may be said to be in general healthy, though, under peculiar circumstances of excessive moisture after great droughts, epidemics have raged in these provinces to a great extent, and particularly in the Fort of Madura, which would lead to the belief that the health of this town may be influenced by local causes.

The streets of Madura are narrow, filled with dirt and rubbish. The ancient drains, from long neglect, are choked up, and rain water is suffered to stand stagnant in pools every where. The streets are crowded with trees of different kinds, chiefly the Palmyra and cocoa-nut trees, and thousands of cattle are kept within the walls of the fort; nor is there any regard to cleansing the various descriptions of filth which are allowed to accumulate.

The houses of the poorest class of the inhabitants, by far the largest proportion of the population of the fort, are of the very worst description of hut, and occupy the smallest portion of space in the S.E. quarter in the neighbourhood of the old palace, where a dense mass of people, and in small houses, have congregated, and where all the cattle are kept, while the N.W. and S.W. quarter of the fort are but very thinly inhabited; and it is in that quarter, *i.e.* S.E. and amongst that particular class of people, where sickness generally prevails and where there is most mortality.

It is well known that the fort or town of Madura has at various times been subject to visitations of fever, generally imputed to wet

and moist seasons following great drought. In 1800 fever prevailed, and from 300 to 400 died monthly. In 1809 a similar fever prevailed, and 2600 persons died. In 1810 there was a more formidable invasion of fever, and 12,500 died between the 1st of March 1810, and the 31st of March 1811, in the Fort of Madura and neighbouring villages; but in this year a general epidemic prevailed over the whole southern provinces, and the mortality was chiefly among the poorest class of people, while the higher orders of society, who lived in elevated houses of brick and chunam, and slept on couches, were comparatively free from the disease; this would imply that the great mortality among the poor was increased from the want of those comforts which the better orders enjoyed; and this is confirmed by the fact, that few of the weavers and still fewer of the Mussulmans were carried off.

In the S.W. quarter of the fort, a numerous and respectable class of Lubbahs reside, and live in good brick houses and raised floors, and sleep on couches. They were attacked with fever, but few, if indeed any, died. The Pallah prisoners, about 300 or 400 in number, have been almost wholly exempt from fever, supposed to arise from their inhabiting a substantial brick and chunam building on an elevated floor, and being well fed.

The sepoys, about 200 men, were attacked very generally with fever, but not one died. This was attributed to their being in a more robust state of body, better fed, clothed and lodged, having every comfort in hospital and prompt medical attendance.

Palamcottah is situated in the province of Tinnevelly, in lat. 8° 43′ N. and long. 77° 49′ E., bearing from Madras S. 30° W. and distant about 300 miles. The fort, which is built on a rocky eminence, is situated on an extensive plain, studded with several small rounded stony hills, the boundaries of which are to the westward. The Travancore mountains running almost due south, and distant about fifteen miles, between which and the Fort is the Palamcottah river; on the eastern side the sea coast distant about thirty miles; on the south, the plain extends to Cape Comorin, distant about fifty miles, and the elevation is about 100 or 120 feet above the level of the sea. The fort is an exact square, measuring 1000 yards on each face, and surrounded by two walls, the inner about thirty-five feet high, and the outer about eighteen; there is no ditch between them; and the number of native inhabitants residing within the fort is, according to a census taken in 1835, about 10,000. Their habitations occupy better than one half of the enclosed ground, the remaining portion being appropriated to a parade

ground, a few public offices, and the dwelling houses of the European officers of the native regiment stationed there; the native houses are small, mostly built with mud walls, and covered with bamboo and the leaves of the Palmyra tree; they are generally very much crowded together, and in narrow streets; but on the whole the fort is tolerably clean, and the inhabitants healthy. Their diet consists for the most part of rice, with small portions of animal food, fish and vegetables. The water generally used is drawn from wells, which are numerous in the fort, and copiously supplied with water, at a depth of about twelve or fourteen feet below the surface in the dry season, and considerably less during the wet. The rise of water in the course of twelve hours after drawing, is about two feet; the water in some of the wells contains a considerable portion of saline matter, and in some is almost brackish; but it does not appear to affect the health of the natives who drink it. The richer class, however, furnish themselves with water either from the river, which is about two miles distant from the fort to the westward, or from a mountain stream which runs nearly parallel with the river, only 200 yards from the fort; but this stream is dried up for six months in the year, as it depends on the quantity of rain which falls in the neighbouring mountains. There is, however, one well about 150 yards outside the fort; the water of which is considered the purest, and is used by all Europeans resident at the station. The native population of the country appear equal in physical strength and health to the inhabitants of any other part of the Carnatic.

The surrounding country is generally laid out in rice grounds, more especially on the western side and on the banks of the river, where its low situation will admit easily of irrigation; the same remark will apply to the north side: but on the east and south the ground is higher, and supplied with water from shallow tanks, the supply of which is soon exhausted; consequently it is better adapted for cotton or dry grain, for which purpose it is chiefly used; and to the southern and eastern extremity of this province there are many salt marshes, some of which are joined together, and form one great marsh of about ten miles in circumference; separated from the sea by high sand hills, which have no natural communication with it, and lay at unequal distances of from four to thirteen miles.

The general character of the rock with which this country abounds is granitic—some hard, close-grained, and permanent, under exposure to the atmosphere, but generally it is loose-grained, and mouldering, composed of quartz, hornblend, and felspar, scaling off in their laminæ, which are soon reduced by the disintegration of the

hornblend to an angular quartz-gravel. The neighbouring hills are chiefly composed of masses of pure white quartz, which seems originally to have formed part of more extensive hills of less permanent quality, and which, in the lapse of ages, have mouldered into soil, of which the surrounding plains are composed. The soil itself is generally of a very red, almost rusty colour, mixed with a good deal of sand, forming, when wetted, a clay, sparingly adhesive. It probably derives a good deal of its colour from an admixture of iron,—it appears of moderate, perhaps rather inferior fertility, producing some rice, a good deal of cotton, and some other dry crops. Palmyra palms succeed well in it, plantations of them being scattered all over the plain, and generally attaining a large size; from which circumstance it may be inferred, that water is found near the surface, and that the soil contains a considerable admixture of saline matter. The plain for some miles to the westward and northward of the fort is more level than to the eastward and southward, and also much more fertile, in consequence of its being extensively watered by cuts from the Tambarapurni river, giving rise to considerable alluvial deposits. The country so irrigated is annually under rice cultivation. The month of January is particularly pleasant and agreeable. In February the weather begins to get warmer, and by the end of March it is hot: part of the forenoons and afternoons are particularly oppressive, there being generally a perfect calm between ten A.M. and two P.M., but after this, the sea breeze sets in, and continues till six or seven, and makes that part of the day pleasant. After the cessation of the sea breeze, there is generally another calm for one or two hours, until the land-wind from the west commences, which continues during the night and part of the succeeding morning. In April there is less of calm, and in the early part of the day a strong hot land-wind blows from the west, and continues from about ten A.M. till about twelve or one P.M. The month of May is the hottest throughout the year; the nights are particularly close and sultry, and throughout the day the sky is cloudless; there is no sea breeze during this month, and the weather is often calm; but when there is wind it is from the west, and very hot during the hottest season, namely, April and May, when the thermometer rises to 96°, 98°, and sometimes 100° in the shade, with a fall to 90° or 88° in the night; but in the cool season or months of December and January, it is as low as 74° or 75° in the morning, and rises to 82° and 84° in the afternoon. The prevailing winds from June till the middle of September are westerly, but varying occasionally between this point

and the S.W.; during the first two months of this period occasional heavy showers fall, and the weather is generally cloudy, which makes the climate comparatively cool and agreeable; but for the remaining period it is for the most part clear and sultry. From the middle of September till the setting in of the N.E. monsoon in October, the weather is close, but sometimes a breeze comes from the south, which, as it is not accompanied with much dampness, is refreshing. From the setting in of the N.E. monsoon till about the middle of October, the wind varies from N. to N.E. as commonly happens; and, until the monsoon is fairly established, the weather is very close and oppressive, but after there has been a considerable fall of rain it continues very agreeable to the end of January. On the whole, the climate of Palamcottah may be considered healthy, inasmuch as it is within the influence of both monsoons, though the S.W. is only partial, but still sufficient to affect the temperature in a very important degree, and for nearly six months of the year, *i.e.* from the middle of October till the end of April, it has the benefit of a refreshing sea breeze during a considerable portion of the day.

The endemic of these countries is intermittent fever, but it assumes every type, remittent and continued under peculiar influences of season. In 1810-11, a destructive epidemic raged over the whole southern provinces of the Peninsula, by which it is stated that the loss of life was estimated at 106,789 persons, or 5½ of the whole population of the country. It commenced in the Coimbatoor, Dindigul, and Madura district, and extended to Tinnevelly at a later period, but, with the exception of those epidemics which occasionally visit these countries after seasons of extreme drought succeeded by extreme moisture, I think the southern division may in general be called healthy.

Coimbatoor and *Salem* are merely civil stations, and therefore need but slight notice in this medico-topographical sketch. Coimbatoor is the capital of this district, and is situated in lat. 10° 59′ N., and long. 76° 59′ E. It stands on a high, dry, and well cultivated country, is neatly built, and consists of about twelve wide well ventilated streets. The houses are built of mud, whitewashed, and covered with pent roofs of tiles or leaves; chiefly the former. The height by barometrical measurement is 1483 feet above the level of the sea. The principal towns in the province are Coimbatoor, Daraporam, Bavany, and Caroor. The inhabitants of the town of Coimbatoor may be estimated at about 10,000, chiefly Hindoos. It is bounded on the north by the Mysore; on the south by Dindigul;

on the east by Salem and Trichinopoly; and on the west by the Neilgherry mountains, and the Paulghaut range. The district is nearly a flat open country, taking a very gradual ascent from the south and east, to the base of the hills which spring boldly and abruptly from the plains. The rivers are the Bavany, the Noyel, and the Amaraiti, and rise among the western hills, taking an easterly direction to join the Cavery, which, passing the eastern frontier, affords an abundant supply to cultivation on its banks. The soil is various: in some places it is a fine pulverized loam, stained with red oxyde of iron; in others a rich black earth; while immense tracts appear to consist of a thin stratum of light brown soil, abounding with a rough impure limestone, of which the roads are generally made; and, from their absorbing principle, are very constantly dry. Granite is said to exist near the surface all over the district. The climate is very pleasant in January and February; the air cold and bracing. March, April, and May, although hot months, are very agreeable. The district is affected by both monsoons, particularly by the S. W. immediately under the hills. South-west winds prevail during June, July, and August. The annual range of the thermometer in the twenty-four hours is from 82° to 85°, and the variations are seldom great. On the south side of the town there is a tank of about three miles in length; its depth varies a good deal; the margins are swampy, and covered with rank grass; it runs nearly east and west. The town is abundantly supplied with water from wells; it is brackish, and said to cause cutaneous affections among the inhabitants.

The endemic disease of this district is fever, generally intermittent, in which form it is not formidable; but when it assumes the remittent form it is very destructive throughout the district. In severe cases of intermittent, the quotidian is considered the most dangerous, and the quartan the most obstinate type. In many cases of the remittent, the patients sink under the attack in a few days, or linger on for a time under visceral obstructions; affections of the spleen, œdematous swellings and dropsy, dysentery and diarrhœa, are the next fatal diseases; and dracunculus, or guinea worm, is very common. In the cure of this, the native doctors are very expert; but when the worm breaks, ill-conditioned sloughing ulcers are always the consequence. On the whole, Coimbatoor may be considered healthy; though there can be no doubt that there is a degree of danger attendant on going amongst the hills at certain periods of the year, where fever is known to have been constantly endemic; as must necessarily be the case in all such provinces as

are bounded by mountains. During the epidemic fever, which raged in the southern provinces in 1810, the average mortality in Coimbatoor, from January 1810, to April 1811, is stated to be about 3¾ per cent. during that period. In the villages, close to the mountains, the average is 5$\frac{1}{10}$ per cent., and 6$\frac{1}{16}$.

Salem is situated in the lowest part of a fertile valley, and built along the eastern bank of a river, which rises in the Shevaroy hills, but, except during the monsoons, is dry. It is in lat. 11° 39′ N., and long. 78° 11′ E. The population of the town is estimated at about 19,021 souls, contained in about 3821 houses; thus giving an average of nearly five inmates to each house. It occupies an area of 265 square acres. Two wide streets run through Salem, from east to west; the other lines of communication are narrow. The inhabitants are chiefly weavers of silk and cotton, tradesmen of different kinds, labourers, and agriculturists. The weavers are considered more healthy than those more exposed to the sun and winds. The soil around is a rich alluvial, spread over a granitic substratum; it is under the influence of both monsoons, and produces two crops annually. The climate is considered cool; the hottest months are March and April, which are regarded as the most healthy. The small detachment of sepoys stationed here are generally healthy. The endemic of Salem is fever. Fevers are most general about the middle or towards the end of the year. Diarrhœa and dysentery are among the most fatal diseases of the natives, and have, at times, prevailed to an alarming extent among the convicts confined in the gaols.

Tanjore is an extensive, fertile, and populous district, between the tenth and eleventh degrees of north latitude; bounded on the east and south by the sea, on the west by Trichinopoly and Tondiman's country, and on the north by the Coleroon river; distant from the sea about fifty miles. The chief inland towns are Myaveram, Combooconum, Tanjore, and Trevalore; and the chief seaport towns are Negapatam, Nagore, Karricale belonging to the French, and Tranquebar to the Danes. The whole surface of the country is a highly cultivated plain, devoid of hills or mountains, or elevations of any considerable height, and covered nearly throughout its whole extent with rice fields, interspersed with topes of cocoa-nut trees. The district is plentifully supplied with water, by branches and subdivisions of the Cavery river, which pervades its whole extent. The Cavery is twice filled during the year; first during the prevalence of the S. W. monsoon, when it receives an immense influx of water from the mountainous regions in which its tributa-

ries take their origin, and thereby attains its maximum both in volume and rapidity; and, secondly, in November, by the N.E. monsoon, which at that time prevails on the coast. To regulate the distribution of water, and to prevent inundations, anicuts, sluices, and embankments, have been formed on the Cavery, at Seringham. By these means an abundant and equable supply of water is afforded to the lands of Tanjore; and a tract of country which would otherwise have been a barren and a sandy desert, is rendered the most fertile, rich, and populous district in the Madras presidency. The soil is dry and sandy at different places; along the coast there are several extensive alluvial marshy surfaces, which, during the monsoon, are covered with sea water, from which salt is deposited by solar evaporation, and yields a considerable revenue to government.

The climate of Tanjore varies considerably at different seasons of the year; at times the temperature is very high, but far from being unhealthy. From the end of October to March, the weather is pleasant and cool, with a good deal of the N. E. monsoon; it then begins to get warm; and, during the months of April, May, and June, the heat is excessive, with high westerly winds, but tempered occasionally by falls of rain, which scarcely allow the ground to get thoroughly parched. Towards the end of June the rain comes down and floods a great part of the country, which cools the atmosphere; but in September it again begins to get warm, and increases till the N. E. monsoon sets in in October. The inhabitants in and about Tanjore enjoy good health; intermittent fevers, however, occur occasionally, but not to any extent; and the cases are generally of a mild and tractable form. The season in which they are most common is during the prevalence of the high winds, to which the natives are apt to expose themselves. The chief article of food is rice, which is generally in abundance; and the water is said to be extremely good, to which the inhabitants impute the great healthiness of the place.

Combooconum is situated in the very richest part of the Tanjore province, and is a place of great sanctity. It is well supplied with water by two large rivers, the Cavery and Coleroon, branches of which intersect it in all directions. It is on a level plain throughout, consisting for the most part of rice fields, with some topes of trees, and here and there a spot for garden ground or dry grain, all alluvial soil, and particularly rich. The rivers are generally full from July till January or February, during which time the whole country is under water; nothing can exceed its fertility, two crops

of rice being frequently raised in seven or eight months. From February to June the rice ground remains dry, and dry grain is cultivated; one-fifth of the inhabitants are Brahmins, the remainder are weavers and cultivators of the land. The town is about 12,108 feet in length, and 5508 in breadth; there are about 150 streets, and 5000 houses; the population is about 30,000: it is a place of great resort in consequence of the celebrity of its pagodas. Cholera raged at one time to a great extent here, but latterly the inhabitants have been peculiarly healthy, though sometimes sickness prevails among the prisoners in gaol to a great extent.

Negapatam is situated on the coast, in lat. 10° 45′ N. long. 79° 55′ E.; it stands close to the beach, about three or four feet above the level of the sea; the town is large and straggling, and the population is estimated at about 10,000, whereof a large proportion are Dutch and Portuguese, descendants of the original colonists; the rest is made up of Hindoos, Mussulmans, and Brahmins. The town is intersected by three principal streets, which are large and open; from these all the other streets lead off, and are generally narrow confined lanes, particularly that part occupied by the Portuguese. The bazaar is large and well supplied. The houses are generally large and substantially built, and roofed with tiles; those of the more respectable natives are clean and well ventilated. The houses of the English European residents, and the respectable Dutch and Portuguese inhabitants, are situated in an exposed and airy situation, to the westward of the town, facing the esplanade; which is a large open space intervening between them and the sea; in the centre of which are the ruins of the old Dutch fort, surrounded by a ditch, which was formerly a receptacle for stagnant water and other putrescent substances, whose exhalations were supposed to have been highly injurious to health, and a public nuisance. This ditch has now been filled up, and these inconveniences have, in consequence, been entirely removed. There is a large river to the south of the town, which is called a back water, and capable of receiving small vessels. The site of the town is on an exposed and level piece of ground, slightly inclined towards the sea, and of a dry sandy nature, surrounded on all sides by an open level country. There are no mountains in the vicinity of Negapatam; on the south there is an uncultivated marshy waste, covered with an alluvial soil deposited by the sea water, with which it is covered during the monsoon; but the gentle slope of the ground is naturally opposed to the formation of stagnant pools of water in or about the town; and a large drain has been formed by which all such accumulations

are quickly carried off into the sea. The roads in the immediate neighbourhood are in excellent order, and most of them shaded by trees. A new wood leading to Tanjore has lately been formed, which is considerably elevated above the marshy ground, through which it passes; and excellent new and substantial bridges have been thrown across an arm of the back water; and some water-courses which lay in its tract, afford a more direct line of communication between the seaport town of Nagore and Tanjore, which is very convenient to the inhabitants. This town is remarkably healthy, and perfectly free from diseases of miasmatic origin; a circumstance which might not be expected from the marshy nature of the country to the southward during the monsoons. The open and exposed surface of the marshy grounds, affording free access to the wind in all directions, prevents the accumulation and concentration of such exhalations as may arise from it; this may account for the immunity from such diseases enjoyed by the inhabitants. The commencement of the monsoon seems to be the most unhealthy period among the natives, who then suffer from dysenteric affections; fevers of an ephemeral type, colds, and other diseases, arising from obstructed perspiration. The fevers, however, generally yield readily to emetics, purgatives, and antimonials; but, occasionally among the native convicts, fever assumes a continued form, and often proves fatal.

The inhabitants are industrious, commercial in their pursuits, and traffic chiefly in rice, coffee, and other articles, from Ceylon and the islands to the eastward. There is no particular manufacture here: weaving, however, is carried on; cocoa-nut and lamp oil are made in rather large quantities by pressure; ship-building and coir rope matting are carried on, but not extensively; and chatties and other earthen vessels are made in great numbers. Negapatam is not a military station, but there is generally a small detachment of sepoys stationed there.

Neilgherries.—In 1829 I had the honour to report to the governor in council of Madras, upon the climate of the Neilgherry mountains with reference to the preservation of European life; and, upon this occasion I took the opportunity of making a few general observations upon their topography and natural productions. I traversed the whole of the Neilgherry, and a considerable part of the Khoonda mountains, and from the survey, I was led to infer, that the climate was in every respect well suited to accomplish a renovation of the European constitution when suffering under the debilitating influence of a hot climate.

The Neilgherry and Khoonda mountains are divided by two rivers, one taking a southerly the other a northerly course, but they are both from a common origin, namely, the Mookoorty peak. The two form the Bowaney river. The mountains are divided into nauds or provinces, namely, Periganaud, Maicknaud, and Todernaud. The first two form the eastern and south-western boundary of the Todernaud, which is chiefly inhabited by Budigars, who are the principal cultivators of the land, as it is only in the provinces that any trace of agriculture is to be observed. The Todernaud is the most elevated part of the Table land, being 7411 feet above the level of the sea; it is likewise the most central, and the high road of communication between the eastern and western coast. It is well protected against both monsoons, by the Dodabet range to the N.E., the Khoondas to the W. and S.W.; skirted on the east by the Periganauds, and on the north by a range of mountains which separates those hills from Mysore. The Todernaud takes in the whole of the table-land from Ootacamund to the Goodaloor pass, and is subdivided into districts called Mullanaud, which includes the country immediately about Ootacamund; Tarranaud, a remarkably fine and extensive tract of country to the east of the Pykarri river, extending north and south from Ootalmund, to the fall of that river into the wooded valley which separates these mountains on its northern boundary from Mysore; and the Keelarum hills extending to the west of the Pykarri river, and north of Mookoorty peak to the Goodaloor pass, the whole constituting the table-land of the Neilgherries, which I consider the most healthy part of the mountains and best suited to all public purposes. The whole of the Todaur country may be called a table-land, being nearly of the same elevation, though formed of swelling hills and valleys covered most part of the year with beautiful verdure, and ornamented with large forests, the symmetry and regularity of which give to the country the appearance of a well kept park: it is more free from every kind of jungle and brushwood than either of the other provinces; and as the natives generally select the sheltered part of hills and the vicinity of woods for their villages, it may be fairly inferred that no noxious exhalations are generated in their neighbourhood. Swamps are formed in the valleys between the hills by the accumulated waters, which are not drained off, and which might give the idea of marsh miasmata; but, although highly saturated with water rendering it impossible to ride over, no rank vegetation of any kind exists; on the contrary, the whole swampy space is covered with fine green swards, and the most

beautiful flowers imaginable, without a single weed, and, when cut into, yields a stream of pure limpid water, without the least discolouration; neither does the temperature of the climate admit of that rapid decomposition of vegetable matter which is supposed to constitute malaria; no deleterious consequences are therefore to be apprehended from these swamps. The soil, in general, is loamy, of a deep brown colour, sometimes inclining to black, and of a depth varying from five to ten feet, rich, and capable of producing every kind of European vegetable. Without any trouble being taken to improve the soil, many European fruits thrive; and strawberries, blackberries, and raspberries, grow wild in profusion.

The mean temperature of the Neilgherries has been ascertained to be as follows: Dodabetta mountain 56°, Ootacamund do. 60°, Kottagherry 63°, Dimhatty 64°. If 60° be the true mean temperature, Ootacamund will correspond with the most southerly part of France. As regards the extreme range and mean height of the barometer, it appears that 24,000 inches was the mean maximum, and 23,869 the mean minimum height; the mean of the two being 23,932, and the mean monthly range 0,131. There was more dry than wet weather during the time these observations were made; and it is therefore reasonable to suppose, that 23,932 inches is greater than the true mean of the barometer throughout the year, and that the mean of the greatest and least height, which occurred, is that which may be considered its true annual average.

The Neilgherries may therefore be regarded as having a climate of which the annual mean temperature is about 60° Fahrenheit, the range not much exceeding the half of that of London, and may be considered eminently healthy; but if the leading features of its proper geographical climate are disjoined, we have a temperature of from 44° to 46° north latitude, with an intertropical quantity of rain. It is therefore a climate of a peculiar nature, and its effects upon health will partake both of a temperate and an intertropical character; it will, consequently, in estimating the healthiness of the Neilgherries, be a safe course to consider what effects are produced in other elevated parts of the world possessing a climate whose temperature is similarly reduced by rarefaction of the atmosphere. Humboldt states, that nearly similar elevations exist within the latitudes of 10° north and south, on the American continent; and from his account it would appear, that the mean annual temperature does not differ materially from that of the Neilgherries. He states, that in these elevated regions the endemics on the plains below do not exist, and instances the farms of Meeroo near Veracruz, about 2784

feet above the level of the sea, as being beyond the limits of yellow fever. Similar observations might be quoted from the researches of other writers, tending to prove the exemption of very elevated tracts from the endemic disorders which exist at their base. Whether this depends simply on a reduction of temperature or the diminished pressure of the atmosphere, or both, is not material as regards the Neilgherries; the fact that they are not subject to the intermittent and remittent fevers, which prevail in the adjacent countries being sufficiently established, and there being no other disease to dread on these mountains, it may be safely inferred that the climate of the Neilgherries is peculiarly well adapted as a resort for invalids.

From meteorological registers which have been kept upon these hills for a series of years by many persons, it will appear that during January, February, and March, N.E. winds prevail, the sky is clear and serene, the air cold and bracing, and the climate at this period is highly delightful and invigorating: April and May are showery, but the air continues temperate; and, notwithstanding the showers, it is generally dry; the wind is chiefly from the north, and they are considered the hottest months in the year: yet exercise may be taken during the whole day by persons in tolerable health, without either fatigue or exhaustion, which could not be done by the strongest and most healthy on the plains below. In June the S.W. monsoon sets in, the winds, however, in these regions generally blow from the W. and N.W. The climate becomes damp, and it continues showery until the middle of December; the air during that period is felt to be humid, and the rains are sometimes heavy and continued, but not in any degree equal to what is observed on the Malabar coast. July and August are perhaps the most rainy months; but September, October, and November are also at times rainy. When there is no rain, there is occasional foggy and cloudy weather; in October the wind gets round to the N.E., and towards the end of December dry cold weather is established. Thus three months are dry, clear, and cold, two months showery, but not damp, and seven months are rainy, foggy, and cloudy, with occasional fair intervals, which enable those who are inclined, to take exercise. The formation of clouds, whether dry or rainy, are extremely sudden, and disappear as suddenly; when the sky is clear it is generally of a deep azure colour, and distant objects appear remarkably distinct. As a proof of the peculiar dryness of the climate iron never rusts, even in the worst weather. My surgical instruments, which were much exposed to damp during the months

of June and July, were perfectly free from rust when I left the hills; and several arrow-heads were found in one of the kairns on the hills, which had, in all probability, been buried there for many years, not only little worn, but in no degree corroded by rust. At the commencement of the S.W. monsoon in June, catarrhs and sore throats were common amongst Europeans, from the sudden change; but they were slight, unattended with fever, and generally yielded in a few days without the aid of medicine. Similar affections also, took place at the setting in of the cold weather, which were equally slight. The natives, at these periods, suffer from slight intermittents and fevers, but they appear of little consequence. Many persons on the hills consider the rainy season as the most healthy, but bowel complaints are not uncommon, and when they do occur it is during the rain.

The opinion entertained by all medical officers, who have resided for any length of time upon the Neilgherries, is in favour of their extreme salubrity; but to those who resort to them for the renovation of health, it is necessary they should inhabit good and substantial buildings with every convenience of comfort and warm clothing, not only for Europeans, but for the natives who attend them, as, without these, the advantages of climate will be lost. How far the climate of the Neilgherries is suited to restore to health such of the European Indian army as may have suffered from hard service, or long residence in India, is a subject of much interest, and, having long given the subject great attention, as one in which the welfare of the soldier, the officer also, and almost every branch of the public service, are deeply interested, I shall venture to make a few observations.

It is a well known fact to those who have long resided in India, that, when the constitution has once received a shock from disease, a long period is requisite to re-establish its powers under the most favourable circumstances; and that those who have so suffered are frequently subject to relapse from the most trivial cause. It is from this circumstance we so often see persons in the higher ranks of society linger in a state of exhaustion, debility, and emaciation, and at length obliged to seek change of climate, either in their native land, or the usual resorts for invalids in the Southern Ocean, *i. e.*, the Isle of France, Cape of Good Hope, or Van Diemen's Land. If such be the effects of disease and climate upon those who have all the advantages of ease and comfort, how much more must they suffer who have none of these advantages! and if change into a more congenial climate be necessary in the one case, it cannot

assuredly be less so in the other. A large proportion of men who are annually discharged from regiments and sent to Europe, are of this description, most of whom have suffered from functional derangement of the liver and digestive organs; the natural consequences of a hot and exhausting climate, in which the powers of the constitution do not readily rally.

In 1829 I endeavoured to impress upon the government the importance of a Sanitarium at that time contemplated, and building upon the hills, and I drew up a variety of regulations for its management, and suggested some improvements in its construction. This experiment, which, for the reasons I shall assign, appeared to me so exceedingly desirable, I regret to say, from causes, which it is unnecessary here to specify, failed in effecting its object. It may, therefore, be useful to make a few remarks upon this plan, which seems to me calculated not only to restore many of the sick to health without being under the necessity of returning to England; but also to be of importance in an economical point of view, by preventing a large and unnecessary expenditure of the public money.

It appears to me that the services of many men would be saved to the government, if removed at an early period to the Neilgherry mountains, where they would at once be taken to a climate, capable of invigorating and restoring the constitution; but under the present system this is impossible, because, when change of climate is thought necessary for the European soldier, he is either invalided for the purpose of being sent to Europe, or he is discharged from the service. The difficulty too of procuring transport to Europe at a time when change of climate is likely to be useful often defeats the desired object, and is the cause of considerable detention, injurious to the individual and productive of expense to government. 1st. The soldier is detained longer in the climate where he lost his health than was contemplated when change was recommended, without any chance of recovery; and, 2dly, it involves a heavy expense on government by detaining men in India who are unable to perform their duties, which will be explained by the following statement, viz., a soldier must be long enough under medical treatment, to enable the surgeon of the regiment to pass him at a committee as *incurable in India;* he must then wait a stated period for the assembling of a regimental invaliding committee, which usually takes place once a year. Having passed the regimental committee, the soldier is marched from wherever he may be stationed (some hundred miles perhaps), to the depôt at

Poonamallee, and there he must pass a second and final committee; and, after all this is completed, he may be detained an indefinite period before any opportunity offers for embarkation, so that, from the time he has been passed as *incurable* in India to the period of his embarkation, he may be detained twelve months or more in the country; and thus he is deprived of the advantage which a change of air or a sea voyage is calculated to afford at the most probable time it was likely to be useful.

This system is applicable to all European regiments on the Madras establishment, but the company's European soldiers have the additional disadvantage of having no sort of provision whatever for them when sent home on account of bad health; unless they have served twenty years in India. A European soldier, therefore, in the company's service, whose health becomes impaired, and is obliged to be sent to Europe before he has served twenty years in the service is discharged, while those of her majesty's regiments may join the regimental depôt in England, where they frequently recover and rejoin their regiments in India.

Almost every regiment that comes to India has in its ranks a great number of young men, whose constitutions are but imperfectly formed; and who, with every inclination, are unable, from physical inability, to do their duty. They nevertheless persevere till their energies and powers fail, when they fall into disease and debility, and are often obliged to be discharged the service and sent to Europe. Others, again, of the same description, not so well disposed, acquire all the vices of the barrack before they are able to carry a musket, and frequently form a class of malingerers that prove a great drawback to every regiment. Almost the whole of the recruits sent to India, are youths of this description, particularly in the Company's service. If such men were sent to the Neilgherry hills for a period of one or two years, they would return to their regiments with all the strength which would have belonged to them, had they remained for that time in their native land, and with the important advantage of having acquired a knowledge of their duty without the fatigue or exhaustion under which they would unavoidably have suffered in the hot climate below, or the temptation to irregularity. Their moral character might thus be improved; they would acquire the knowledge of taking care of themselves without the aid of designing friends, and, consequently, be less liable to fall into improper hands, or follow the bad example of those who, under ordinary circumstances, would have misled them.

Taking all these circumstances into consideration I am decidedly of opinion that, from the geographical position of the Neilgherry hills as a central point for European troops, from its peculiarly healthy climate and local advantages, that regiments on their first arrival in India might be stationed there under every possible advantage, while the constitution of the young and unformed soldier would be preserved from the injuries it usually receives by sudden change of climate and habits as already noticed.

A suitable establishment formed upon the Neilgherry hills for this purpose, under proper regulations and good management, would doubtless be attended with great public benefits, both as regards the health of the European troops and a consequent saving of public expenditure; while a Sanitarium under these circumstances could be formed with every prospect of success, to which the sick soldier could at once be sent when change of climate was thought necessary, and thus obviate all the inconveniences already noticed.*

Northern Division.—This extends from the left or north bank of the Kistnah river south, to Ganjam north, along a tract of country between a range of mountains and the sea-coast. The district of Masulipatam includes Bezwarrah, Rajapoor, Condapilly, and Ellore, which are situated in an extensive flat country, between two great rivers, the Kistnah and Godavery, and it is so low, that it has the appearance of having been gained from the sea by depositions of sand and mud from the freshes and overflowings of the sea that have occasionally taken place. To the north of the Godavery river, the range of mountains approach nearer to the coast. The stations north of this river, and near to the coast, are Samulcotta, Vizagapatam, Vizenagram, Cicacole, Burrampoor and Ganjam; and within the mountains are Kimmidy, Palacondah and Goomsoor, all of which require to be noticed.

Masulipatam is the principal military and civil station in the northern division, situated in lat. 16° 11′, and long. 81° 13′ E., distant from Madras 193 miles, and bounded on the east by the Bay of Bengal. For a distance of twenty miles it bears north and south; it then takes a gradual bend to the N.E. To the north, it is bounded by the Godavery and the district of Rajahmundry; to the S.W. by the Kistnah and district of Guntoor, and to the N.W. by the dominions of his Highness the Nizam. The greatest length from east to west is 136 miles, and the breadth from north to

* The management of troops upon their arrival in India and the means of obviating sickness and loss of life during their stay in the country will be fully treated of in a subsequent chapter.

south, between the Godavery and the Kistnah, ninety-three miles; embracing a surface of 8500 square miles, and a population of 304,317 souls; of which there are males, 163,905, and females, 140,412; but this number suffered a great reduction by the endemic and famine of 1833 and 1834, which, it is calculated caused a loss by death and emigration of 80,000. With regard to the elevation of the country, for the distance of forty miles it presents an almost level plain surface of alluvial soil, it then becomes mountainous, and has a gradual rise as we approach the Nizam's country. The prevailing winds, for eight months of the year are southerly, commencing in the middle of February and ending in October, when they shift to the N.E. and then continue until February. The chief mountains are the Bezwarrah and Condapilly ranges, running nearly north and south; the base of the former is washed by the Kistnah River, has a bold, perpendicular, abrupt termination, as if a passage had been cut through the rock, and the road to Hyderabad runs along its base. This range is separated from that of Condapilly by a narrow passage, the two forming a valley of nine miles in length, and six in breadth, of great fertility, consisting of rich black alluvial soil, and is terminated by the river. The hills are composed of granite and syenite, and covered with brushwood. The elevation of the highest peak of Condapilly is about 1500 feet; thus the range runs N.N.W. for fifteen miles, at the base of which are situated the once celebrated diamond mines of Pentialla, a village of his highness the Nizam. The only rivers worthy of notice are the Kistnah, Godavery, and Keesera. The first empties itself into the sea by several mouths, the principal branch at Devi, fifteen miles south of the fort. It is navigable in the monsoons as far as Bezwarrah, but in hot weather it is nearly dry; the banks for nearly fifty miles are clayey; it afterwards becomes rocky, in some parts twenty feet in height, and generally clear of wood. The Godavery enters the sea by two great branches which separate from the main body of the river at Rajahmundry; the breadth of the river at this place is about three miles, and passable by boats. The Keesera is a mountain stream, and falls into the Kistnah, about twenty miles from Condapilly, crossing the Hyderabad road. The only lake in this district is the Colar Lake, midway between Masulipatam and Ellore, twenty miles in length and twelve in breadth; but its dimensions vary according to the seasons of the year and the fall of rain. In a heavy monsoon it is double that size, and navigable for small boats: rice is cultivated on its sides, and it abounds in large fish and wild fowl. In a district of such extent, differing so

much in the elevation and nature of the surface, as well as distance from the sea, great diversity of climate must necessarily be looked for; at Masulipatam itself the climate is of a more equable and of a moister nature than in the elevated parts of the district, where the climate assimilates more with Hyderabad, and the alternations are very remarkable. The soil for upwards of fifty miles is a black alluvium, enriched by the overflows of two large rivers: in remote parts of the district it consists of various mixtures of cotton ground, calcareous earth, and red loam. There is granite in abundance, and limestone in nodules, close to the surface, and large masses on the banks of the Kistnah River in the form of marble; and pisiform iron ore is found in the hills of Condapilly.

The fort of Masulipatam is situated about 1½ miles from the sea, surrounded on all sides by a swamp, which is three feet above low water mark, and would be overflowed every tide were it not that three dykes have been run across the eastern, western and S.E, sides; latterly, however, they have got much out of repair, and the swamp is partially overflowed, particularly in spring-tides. The circumference of the fort is about two miles; it is built of brick, which in many places is in a very dilapidated state, and surrounded by a wet ditch which is nearly choked up with mud. The interior of the fort is laid out with great regularity; the streets, which are at right angles with each other, being wide, and the houses well ventilated, and kept quite clean; they consist in general of substantial brick and tiled roofs, and some are constructed of spars of wood, covered over with cow-dung. There is an open square parade, about 300 yards; barracks for a European and a native regiment, a spacious arsenal and depôt of medical stores for the division. The fort communicates with the Pettah by a causeway of 1½ of a mile in length, edged with bricks, but in the dry weather the swamp is dry and passable in any direction, except directly south. The Pettah is situated parrallel to, and along its borders, extending from N.E. to S.W., for a distance of 4½ miles. The native town occupies about three miles, and the houses of military officers, and of the civil departments, about 1½ miles; the breadth varies from 1½ to ¾ of a mile; both fort and Pettah are placed in a bed of sand. The wells of the fort are all so brackish as to be unfit for drinking, except one, which only contains about forty-five grains of saline matter (chiefly muriate of soda) in a gallon. The natives generally use this, but the greater part of the inhabitants, as well as the Europeans, are obliged to procure water from the Pettah. The seasons may be divided into hot, rainy, and cold—the first com-

mencing in March and ending about the middle of June. The rains continue from June till the end of October; the greatest fall is in the S.W. monsoon, and the average annual fall is about thirty-five inches. The cold season commences in November, and terminates about the end of February; at this season the sky is generally clear, and a cold breeze blowing from the N.E. and N.; the mornings are cold and bracing. The thermometer ranges from 54° at sun-rise to 70°, the mean temperature being from 65° to 76° at noon, during the months of November, December, and January: in February, there is a range from 64° to 84°, in March from 70° to 90°; April 80° to 92°; during these latter two months, which are the most disagreeable in the whole year, the wind is generally from the S.W., very high, and of a most relaxing and debilitating nature: in May the temperature rises to 96° at noon, and is sometimes as high as 104°, at sun-rise from 80° to 86°. The hot land winds set in pretty regularly about the 8th or 10th of May, from the N.W., but the excessive heat is tempered by the sea-breeze, which at this period usually sets in early in the afternoon. These winds continue steadily to the end of the month, when dense masses of clouds accumulate in the S.W., and in the evening north-westers, with thunder showers, are frequent; but the hot winds seldom terminate before the middle of June, when in regular seasons the rain commences, reducing the temperature to 86°. The climate may be considered hot and moist; but, although I have reason to believe that the mean temperature in the shade is less by two or three degrees than at Madras, yet by the sensation it may be thought greater, particularly in consequence of the reflected heat from the sand, and the saline crust on the sand in dry weather, which in high sunshine exhibits in an extraordinary manner the appearance called mirage. The alternations of temperature are not so great as at Hyderabad, and other parts of the Dekkan, where it is not uncommon to have a diurnal range of 30° or 40°, whilst at Masulipatam the greatest range ever noticed was 24; upon an average, during the cold months of November, December, and January, the range seldom exceeds 10° or 12°, and during the rest of the year the temperature between day and night is much more equable.

The soil of the swamp is sandy, but consolidated by portions of clay, which gives it tenacity and hardness; when in a dry state however, it is possessed of a great absorbent power, so that water does not under these circumstances, remain long on the surface, but evaporates rapidly. To the southward and westward of the fort, the swamp is always covered with water every tide, leaving a mass

of black mud at the ebb; from this quarter, therefore, noxious exhalations may be supposed to arise, when the wind is southerly and westerly; but the almost total absence of vegetable matter in that quarter, except samphire, renders it nearly innocuous. Although there has been a great deal of sickness in later years at Masulipatam, both among Europeans and natives, I am of opinion, from five years' experience as garrison surgeon of that station, that malaria from this source, in ordinary seasons, has very little influence in producing fevers, and that the sickness which has prevailed has depended more on the irregularity of seasons, than from any local causes; for it is a remarkable fact, that European officers, and gentlemen of the civil service, enjoy as good health as in any other station. From 1807 to 1810 inclusive, there was not a single death among the European officers or civilians, residents of Masulipatam; and for the same period, the artillery and garrison staff, amounting to an annual average of about 140, the deaths in the four years were only thirteen; in 1807 none; in 1808 six; in 1809 four, and in 1810 three. From 1808 to 1811 inclusive, out of an annual average of 750 men of his Majesty's Royals and the Madras European regiment, the deaths in four years were 109, chiefly of dysentery and fever; or in 1808, strength about 700, deaths forty-one; eight months in 1809, deaths fifteen; ten months in 1810, strength 450, deaths twenty-two; and in 1811, strength 1100 men, for seven months, deaths thirty-one. In latter years the troops became more sickly, and in 1832, out of an effective strength for nine months of 370, the deaths were thirty-eight; and of his majesty's 45th regiment, effective strength 763, the deaths were 127, on the march from Arnee to Masulipatam. In 1833 his majesty's 45th regiment for three months, strength 354, lost by deaths at Masulipatam, sixteen, and his majesty's 62d regiment out of an effective strength of 422 men, lost on the march from Bangalore and at Masulipatam, in that year, 163. In 1834 it ceased to be a station for European troops.

During the above period an epidemic fever raged throughout the northern division, caused, it was supposed, by excessive rains after years of drought; and since that period Masulipatam has again become as healthy as any other station; which proves that this epidemic depended upon irregularities and peculiarities of season, and not from localities. Masulipatam, therefore, in regular seasons, may still be considered a healthy station, as the causes of sickness in the years mentioned may, with equal justice, be applied to the healthiest stations in India, under similar circumstances.

Mr. Stevenson, a very able and intelligent medical officer, states in a report to the Medical Board of Madras, in 1836-7, that during an experience of seven years at Masulipatam, he had not treated a single case of remittent fever among the commissioned ranks of the army and civil service; and not more than two cases of hepatitis, which he imputes to the equable temperature of the climate.

During March and April, as already stated, the S. W. winds are very prevalent, commonly called the long shore winds, accompanied with clouds of black dust. To Europeans this is the most disagreeable period of the year; the wind is most relaxing to the system, occasioning excessive languor and debility; head-aches and derangement of the biliary organs. Masulipatam is particularly exposed to this wind, while a few miles (about twenty-four miles,) up the coast at Golapollam, there is a delightful cool seabreeze, where invalids often resort. Sick officers, men from Kamptee, Jaulnah, and Hyderabad, often come to Masulipatam on account of health; and it would be an object of great importance to that class of persons, if some suitable arrangements were made at Golapollam for their reception; it would add materially to their comfort, and contribute greatly to the recovery of their health, avoiding all the inconveniences of excessive heat, and the discomfort they are necessarily exposed to at Masulipatam. The sick from the interior seldom arrive at Masulipatam before the month of March, and are thus exposed to the influence of the whole of the southerly, and to the sultry heat of the land winds, which to men labouring under chronic visceral disease, with debilitated, broken-down constitutions, are not favourable to a healthy tone of the stomach and bowels, and, consequently, the change is not attended with the advantages looked for: these are facts well known to all acquainted with Masulipatam. The prevailing diseases in common years, are ephemeral fever, dysentery, and diarrhœa, easy of cure; but in seasons of great drought, famine, and excessive rains, these diseases assume a more formidable character, either in the quotidian, intermittent, or bilious-remittent.*

Ellore was, in former years, a large cantonment, but, at present, is only a station for one native regiment. It is a place of considerable extent, and a crowded population, about sixty or eighty miles north from Masulipatam. The houses are closely built to each other, with large trees in the compounds which intercept a free circulation of air. The Pettah, towards the western extremity, has much jungle about it, and to the N.W. is a large tank of water, and an old mud fort in

* See my Sketches on the Diseases of India, p. 284.

ruins. North of the Pettah, and close to it, there is another large tank separated by a bend, through which water frequently escapes into the Pettah, part of which forms into green stagnant pools, in many places. Along the eastern side and close to the pond, is a range of houses and trees, connected with the Pettah, and terminated by a nullah and a tank. The regimental lines and parade ground are situated due north of the Pettah, distant about half a mile, bounded on the south by a nullah and a grove of trees which intercept the sea-breeze. There are no trees in the regimental lines, though there are many in the neighbourhood, and the lines are clear, with regular capacious streets. It is distant from the sea in a direct line about thirty-five or forty miles, and very little elevated above the sea, and a considerable part of that space is occupied by the large lake of Colar, already noticed. The cultivation ceases about three miles north of Ellore, and a continuous jungle extends to the mountains. In heavy monsoons the surrounding country is often overflowed from the numerous tanks and nullahs in the neighbourhood, and intermittent fevers, of various forms, prevail during the wet season; and, during the hot season, the weather is particularly close and oppressive, the thermometer often ranging as high as 104° and 108°. In the year 1794 a very destructive fever raged among the European troops in this cantonment, and Dr. James Anderson, the late physician-general of Madras, gives an account of a similarly destructive season that happened under his own observation in the same district many years before that period. He says that, during two years' service in taking possession of the northern Circars (in 1765), he observed twelve days in one season, and fourteen days in the other, when the heat and vitiated state of the atmosphere was such, that sometimes the men, without any previous illness, fell down dead at roll calling;—many palankeen boys and harcarrahs died suddenly on the road;—some of the officers could not sleep from the fear of suffocation. Various birds of the forest took shelter in tents, and could not be driven out, and drank water when offered to them, as if they had been domesticated. A hare came into the tent of Adjutant Gee, and drank water out of his hand;—several antelopes were easily taken by dogs, that, at other times, could not get near them, and many other instances of the kind could be mentioned.

Bezwarrah, Rajapoor, and Condapilly, although in the district between the two great rivers, are not stations for troops. There is a company here at Condapilly, but the climate of the whole of this district is very much alike, making the distinction between that part on the sea-coast and more inland in the neighbourhood of mountains.

Rajamundry.—The fort and town of Rajamundry are situated on the left bank of the Godavery river, distant from the sea about thirty-five or forty miles. The fort is about three quarters of a mile in circumference, and contains within its walls, the fort, the station hospital, barracks for a detachment of sepoys, and two bungalows for the accommodation of the European residents. The town, which joins the southern part of the fort, is irregularly built, chiefly of mud, with roofs of palmyra leaves; though some few of the houses are of a better description, having tiled roofs. The streets are narrow, and the buildings are much crowded together; it is said to contain from 15,000 to 20,000 inhabitants, chiefly Bramins and Gentoos, whose habits are quiet and well-disposed. There is also a small Mahomedan community, poor and wretched. An excessive indulgence in the use of opium and tobacco is common among all classes of inhabitants; and by early acquirement becomes an indispensable habit. The Europeans live in buildings on each side of the fort, having commodious and healthy sites; and, with the exception of the great expanse of water, during the period when fever prevails, there does not appear any other assignable cause for fever at this station.

The soil absorbs rapidly any rain that falls, which is considered conducive to health. The country in the vicinity of Rajamundry is undulating, and capable of high cultivation; but at present it is much overgrown with underwood. The soil is of a fine vegetable mould, with a considerable quantity of pebbles intermixed, and necessarily absorbs the rain, which commences to fall about the middle of June, and continues more or less violent till the beginning of October. During these rains the river rises to its utmost height, and frequently overflows its banks, inundating the surrounding country for miles; particularly that portion which is situated on the right bank. The rice cultivation commences on the subsidence of the waters; and, during the months of November, December, and January, the weather, particularly towards morning, becomes cold and chilly. After a season of plentiful crops, rice and all other necessaries of life are so cheap, that a native can live well for one rupee per month.

Samulcotta is situated at no great distance from the north bank of the Godavery river, in a N. E. direction. The country is perfectly flat, and cultivated chiefly with rice in the rainy season. As you approach the hills to the north, the ground is higher, and the dry grains are cultivated. The hills are about twenty miles distant, appearing very high; and looking to the N. W. a break is observed,

through which the Godavery river runs in a southerly direction till it reaches the sea.

Samulcotta is situated at the commencement of a very gentle slope of dry and hard ground, which gradually rises towards the west, and probably extends to the banks of the river. The soil is gravelly to a considerable depth, and in many places the surface is completely covered with quartz and felspar débris. Vegetation in such places is extremely scanty, while in the hollows it is more luxuriant. The seasons are similar to those already mentioned in this division; but, from the nature of the soil, which is a red kind of earth, with a considerable quantity of gravel, it indicates no unhealthy exhalations.

On the south face of the fort is situated the Pettah, to the S.W. at the distance of 100 yards from the ramparts; and on the open plain are the regimental lines, built in regular and capacious streets; and, on the west face of the fort, and to the north, are several officers' bungalows. Except in the direction of the Pettah, the vicinity of the fort is very clear of wood; the topes (or groves) being situated at some distance from it. It is not well supplied with good water, but good water is procurable at about half a mile to the N.W. of the fort. From inquiry it appears, that the inhabitants of this place and the surrounding villages, have experienced less fever than at Rajamundry, and that part of the country; and compared with other parts of the division, it may be considered a healthy station.

Vizagapatam.—The site of Vizagapatam fort is very low, and little above the level of the sea. On the east it is open to the sea, and on the S. and S.E., it is bounded by high hills. The barracks (which are occupied by the European veteran battalion) and all other public buildings are in the fort. The sepoy lines are outside the fort, and situated between it and Waltair, in the neighbourhood of a back water, behind a ridge of high ground, which completely shuts out any view of the sea. From this point there is a gradual ascent to Waltair, where most of the European inhabitants reside. At a distance of about two miles to the westward of Waltair there is a considerable range of hills, extending from west to east, terminating abruptly and perpendicularly in what is called the dolphin's nose into the sea, at the foot of which is the town of Vizagapatam.

The relative position of the town of Vizagapatam and Waltair, follows the course of the road leading from the fort to a part of the coast called Lawson's bay, about five miles in a N.E. direction from the fort. Between this road and the sea, on high ground, is Waltair,

overlooking the sea, and having the fort of Vizagapatam upon its S.W., and Lawson's bay on its N.E. angles.

Between the hills and the town the soil is a hard arid sand, and at Waltair it is interspersed with rocks, having a large proportion of ironstone mixed with it; but where the soil is free from stone, it is rich, and capable of high cultivation; the gardens are therefore excellent, and the water abundant, and of good quality. It is more under the N.E. than the S.W. monsoons, and does not suffer materially from the land winds. Waltair is considered a very healthy station, and has been exempt from the sickness which has prevailed so much in latter years in the southern stations of this division.

Vizenagrum.—The cantonment of Vizenagrum is eligibly situated upon rising ground and open plain, about twenty-five miles from the hills, and distant from the sea about twelve miles. On the south face of the fort of Vizenagrum, about 2½ miles N.W. of the cantonment, there is a large tank which extends towards the cantonment. The place of arms, hospital and stores, are situated on the western side of a fine parade ground, and the sepoy huts are ranged in regular and capacious streets on a gentle slope, which carries off all the water during the heavy rains. The temperature of the cantonment is high; but it has the advantage of a fine sea-breeze, which continues to blow regularly all day till the land wind commences at night. The soil is rocky and gravelly, water of excellent quality, and in sufficient quantity, and the gardens are good, producing the finest vegetables. The wind is sometimes extremely high, unroofing houses; but the cantonment is considered very healthy, and was, comparatively, free from the fevers which have lately appeared in the more southern parts of the division. There is also a most striking difference in the appearance of the inhabitants of this part of the country, and those living south of the Godavery river. The latter exhibit the most wretched poverty and disease, while these people have all the appearance of health and vigour. The country also bespeaks greater advantages of climate in the flourishing state of agriculture, the improved condition of cattle, and the prosperous appearance of the villages in general. The cantonment is free from all rank and overgrown vegetation, and the absence of rice grounds and pools of stagnant water, both here and at Samulcotta, bear unequivocal proof that they possess a powerful influence in preserving the health of the troops.

Cicacole is situated on the north bank of the Mungaloo river, which, when full, is about half a mile wide; but, during the dry season, it is much less, and of inconsiderable depth: it has a sandy

bed, interspersed with granitic rock. The country to the E. and N. E. of the fort of Cicacole, for about three miles, is rice cultivation, from tanks in its vicinity, which are usually dry during the hot season, when water for domestic purposes is obtained from the river, or from wells; some of which are brackish, and unfit for culinary use; but to the north of the town there are some nullahs that appear to have water most of the year. The old mud fort contains the quarters of the commanding officer, medical officers, and non-commissioned; barracks, commissariat stores, hospital and magazine, which surround the parade-ground. The remains of the old ditch is still to be traced, having water in many parts of it. On the south face of the fort is the Pettah, and a tank about 100 yards from it. To the S. W. at the distance of 100 yards from the rampart, and on an open plain, are the regimental lines, built in regular and capacious streets. The town of Cicacole is populous; bazaars are well supplied with all kinds of provisions of good quality. The soil is chiefly sand, interspersed with patches of ferruginous gravel, which prevents the lodgment of water to any extent during the rains. On the south side of the river, rice cultivation abounds from tanks of considerable magnitude, which also become dry in the hot season, from the water being drawn off for irrigation, as well as from evaporation. During the cold season of the year the winds blow from the Palcondah hills, which are situated about twenty miles in a northern direction from Cicacole. These winds are frequently accompanied by heavy fogs, which check perspiration and causes fever. Cicacole cannot, therefore, be considered altogether free from those local causes which may be supposed to produce fever, although the inhabitants do not appear to have experienced any unusual degree of sickness during the late period of sickness in the southern parts of the division.

Burrampoor is situated on slightly elevated ground, in a valley about fifteen miles broad, and equidistant from the sea and neighbouring hills—within the range of the sea-breeze on one side, and the dampness attracted by the ghauts or mountains on the other. The country around Burrampoor is very beautiful, and highly productive, being one extended sheet of cultivation, studded plentifully with mango groves, topes, and villages. It is not exactly level, but nearly so, and composed of gentle slopes and undulations or swellings of the ground, adding greatly to its beauty. Rice is the chief cultivation, but various kinds of dry grain are raised in the more elevated parts of the country, and patches of dry cultivation are numerously placed on the sides of the neighbouring hills. These

hills are inhabited by a class of persons quite different to those on the plains, and are called Souras and Gonds. To the N.W. and N. and N.E. hills are seen which appear to be the boundary of an extensive plain in the distance, and passing down towards Ganjam.

The range of hills which passes near Burrampoor ceases about four miles farther north, permitting the plain country to extend several miles to the west, where it is again bounded by other hills running in the same northerly direction, and studded here and there by detached craggy and rough hills, composed of abrupt, perpendicular, and angular pieces of granite, striated, and numerously speckled with pieces of quartz, of the size of a man's hand, giving it a variegated or mottled appearance, which is the general characteristic of all the hills of this country. These detached hills continue in a northern direction till they arrive at Ingaley, about eight miles from Burrampoor, where they turn towards the east in the direction of Ganjam, and form a division in the plain. The soil from Burrampoor to Ingaley, when not washed away by the rains, is generally the black loamy cotton ground, varying in depth from a few inches to as many feet. Under this is a yellowish brown sand, and in the lower part of the soil (chiefly in the sand) nodules of limestone plentifully appear. The country is one extensive sheet of cultivation, and mango groves are seen all over the country. Ingaley is situated close on the south or right bank of the Ganjam river, which is here one-third of a mile broad. It is a large flourishing village, and weaving of cloth is the chief occupation of the inhabitants. The banks of the river are about eight or ten feet high, composed of deep brown loam, and the bed of the river is yellow sand.

The cantonment is built on a gentle elevation, about nine miles inland from the sea; it is open, and free from much wood, but limited in its extent. The officers' quarters are upon the most elevated part of the ground. The place of arms, parade-ground, and the regimental lines, are situated due west of these, upon a slope of no great extent, and bounded by low rice fields. The powder magazine and collector's cutcharee, which were erected on the south side of the parade, was found in the monsoon to be so low and liable to damp, that it became necessary to remove the powder from it. The men's huts, being on the western slope of the parade ground, experienced the same inconvenience; yet no unusual sickness prevailed. During the monsoon the winds blow with great force from the hills, which are only seven miles west of the cantonment; and it is generally believed here, as well as at Cicacole,

by the natives of the country, that the winds which blow from the hills is productive of fever. The hills in the neighbourhood of Burampoor are covered with bamboo jungle, the water is generally good, and there is an ample supply of it.

The rice ground about Burrampoor is in constant cultivation all the year round. Although Burrampoor is not generally considered an unhealthy station, from its approximation to the neighbouring hills, I fear it must, in some degree, be under their influence; as from the medical returns it would appear, that in general there are more sick in the regiment stationed there than at many other stations; but this may be explained by the circumstance of detachments of the regiment being sent into the hills, and returning sick from that duty.

Ganjam is the northern boundary of the Madras Presidency, on the eastern coast, and was formerly a large populous place, having a fort on the north bank of a large river, near its entrance into the sea. The town was originally near the fort, on high and dry ground; but was removed about sixty years ago, in consequence of its vicinity to the fort being considered inconvenient and improper to a situation lying to the north and west end of the fort, which appears very ill chosen, being low and surrounded by rice cultivation, and subjected to overflow from the river, rendering the houses very damp; as none of the floors of the houses are sufficiently raised to protect the inhabitants from dampness caused during the rains, and the rice cultivation.

Ganjam has generally been considered a healthy station; and I have no doubt, when the seasons were regular it was so; but in latter years fever has raged to a very considerable extent, and has caused so many of the inhabitants to leave it, as to give it the appearance of a deserted village. Whatever may have been its character in former years for salubrity, it appears to me that, from its peculiar locality it must, at all times, have been more or less liable to fever at particular seasons. As the site is low, surrounded by marsh grounds, and in the neighbourhood of high mountains covered with jungles, during the nights and mornings a line of damp vapour is seen hanging over Ganjam, in the line of the swamps and rivers; and in the cold weather the fogs are exceedingly heavy, and are supposed to come from the hills: it is impossible, therefore, that Ganjam could be altogether free from fever at any time; although when the seasons were regular it might have been more healthy than it has been in later years. The healthiest season is during what is called the long shore, or southerly winds, in the

months of March and April, and during the hot weather, when those winds are sufficiently strong, and continue sufficiently long to disperse and dissipate the vapours which collect over Ganjam. In the cold and rainy season of November, December, January, and February, the endemic fever of these provinces always prevails to a greater or less extent, but after the commencement of the hot weather, and after the southerly winds set in the febrile diseases, not only at Ganjam, but in the interior of the province, generally cease; so that from March to November, when these winds blow, and the seasons are regular, Ganjam and its neighbourhood are healthy; and this is the opinion of an old and experienced medical officer who resided many years at Ganjam, and who lays this down as a rule applicable to this part of the country.

Goomsoor is a territory about sixty miles by forty, and covering an area of not less than 2400 square miles, situated in the Ganjam district, at the N.W. extremity of the northern circars. It is divided into two portions, viz. *Goomsoor Proper*, which lies chiefly in the plain, or in the lower range of hills, and in which are the marshes from whose pestilential effluvia our troops have suffered so severely, and *Goomsoor above the Ghauts*. In Goomsoor Proper there is much jungle and much uninhabited territory; but Goomsoor above the Ghauts is a province of exceeding fertility. Never have been seen in India greater abundance of the finest poultry, sheep and cattle, than greeted the eyes of the soldiery as they rose over the mountain top, and looked down on this hitherto unknown land, full of beautiful villages in romantic situations, and teeming with plenty. The inhabitants are Khonds, a perfectly distinct race from the men of the plain, speaking an entirely different language; armed with bows and arrows, and battle-axes, according to the feudal service of the mountain leaders, and possessing a variety of savage virtues. This territory had, I believe, never been trodden by European foot, till the troops in the last campaign ascended the Ghauts. It had been the policy of the native Omlahs in the plains to mystify their European superiors on this point. Goomsoor had been ever depicted in saddened colours, as celebrated for jungle, pestilence, and wild men; not a word was breathed of mountain passes, through which vast quantities of smuggled salt were conveyed into Berar and Central India; not a syllable was heard of smiling villages and fertile valleys, or a happy and contented people, conspicuous for their mountain virtues, endurance, bravery, and invincible fidelity to their hereditary chiefs. Omlahs are ingenious fellows when they desire to establish or retain a mystery;

and so well did they succeed in Ganjam, in keeping away every thing bearing the semblance of information respecting the *terra incognita* of Goomsoor, that even six weeks after the troops were under orders for the campaign, not the site of a single village, fort, or stockade, was known; not a route, ford, or simple Bringaree Ghaut ascertained, nor even where the great line of Ghauts commenced; in a word, not a single item of intelligence necessary to advance into an unknown country, had been procured; nor a single individual forthcoming to whom the language of these hillmen was intelligible!

Goomsoor is remarkable for the sweeping nature of its valleys, and the absence of all natural levels. The cultivation of rice in this district is extensive; and it is promoted by artificial levels, effected by scarping away the slopes, by which numerous tanks are formed. The soil consists of the débris of granite, mixed with a rich vegetable mould of considerable depth. The temperature of the Ghauts varies much from that of the low countries; from the height of the hills the sun does not appear until half an hour after it has risen upon the plains, and sets proportionately early. At night, in the cold season, the cold is excessive; ice is readily procured, and the mornings present an extended surface covered with hoar frost. The experience hitherto obtained with respect to this country is not sufficient to enable me to state with precision the character of the diseases most rife among the people; but from the reports of the medical officers it appears likely, that above the Ghauts the inhabitants must be exempt from the operation of the malaria, so prevalent in the jungles of the low country. The population of the lower part of Goomsoor has been estimated at 90,000 people, inhabiting 507 villages, which are formed of two lines of houses built of wood, and neatly planked outside, all connected and arranged so as to form two semicircles thus: ·◯· with a permanent barrier at each entrance. The climate of the lower part of Goomsoor is, for the greater portion of the year, pleasant to the feelings; but each season has its peculiarities. The hot weather commences in March; in April the heat is excessive; and at Nowgaum, the site of the head-quarters camp, the direct rays of the sun in a subaltern's tent raised the thermometer during the heat of the day, *i. e.* from eleven A.M. to four P.M., up to 110° and 114°; the common heat of the season was 110°. After sun-set the evenings become cool, and the mornings, favoured with a gentle breeze; and it was only when the sun rose perpendicularly over head, that the excessive heat commenced. Towards the latter end of May the

breezes are gentle and refreshing. During the warm months there are frequent thunder storms, and violent gusts of wind, carrying every thing before them, generally attended with heavy rains, and occasionally hail. By these the atmosphere is much cooled, and the hot season is looked upon as the most healthy; whilst the cold season is generally regarded as the most sickly. In the early months of the monsoon, the diseases are fevers, followed by dysentery; and in the latter months, fevers with hydropical effusions.

Provinces of Malabar and Canara.—These provinces form the principal part of the Malabar coast, and extend from Cochin to Sadashevaghur. They are comparatively low, but broken, and much interspersed with rivers, back-water, and extensive ravines, shaded with woods, and filled with an industrious population. The more inland mountains are covered with forest, jungle, and underwood, and in many places barren. It is on the sides of the valleys and ravines, and on the banks of the rivers, that the inhabitants chiefly reside. There are few towns, and these of no very great size. The chief military stations for European troops are Cannanore, Tellicherry, Calicut, Mangalore, and Cochin. In the month of February, the low country becomes excessively hot, and the vapours and exhalations so thick, that it is difficult to distinguish objects at any considerable distance. The heat increasing during the months of March and April, a great quantity of moisture is collected, which remains day and night in a floating state, sometimes attracted to the tops of the mountains, where it is condensed by the cold, and descending immediately, is again rarefied, and becomes vapour, in which state it reaches the earth. Thus the vapour and exhalations fluctuate and accumulate, until the setting in of the western monsoon, when the whole is condensed into rain. That portion of the Malabar coast which is washed by the ocean consists of sandy plains, seldom extending more than three miles in breadth. Near the first or low ranges of hills which arise from the coast, these plains are most fertile, and are generally subjected to rice cultivation. Nearer the sea, the surface is more unequal, rising into low downs, on which grow numbers of cocoa-nut trees. This part of the country is much intersected by inlets of the sea, which often run for great lengths parallel to the coast, receiving numerous mountain-streams and rivulets, and communicating with the ocean by several narrow and shallow openings. In other places, where there are none of those salt-lakes and inlets, the low lands within the downs on the sea-coast are, in the rainy season, completely overflowed: for the fresh water has there no vent, and must conse-

quently stagnate, until it is gradually evaporated. As it dries up, it leaves the sands fit for some particular kinds of rice; and it is probably owing to cultivation, and the sandy soil, that the stagnant waters do not materially injure the salubrity of the air: for this country cannot be considered as unhealthy, even with regard to the European constitution.

The rivers and mountain streams along the whole of the coast are very numerous, owing to the vicinity of the Western Ghauts to the sea. The fresh water poured from them upon the low grounds on the coast, mingling with the salt water in the lakes, inlets, and marshes, which intersect it, would most probably occasion much more disease than actually occurs, if the soil were different from what it is. But here the downs and the sandy nature of the subsoil are not very productive of exhalations: and the ranges of hills covered with woods and forests, which in many places rise abruptly from the low grounds and marshes, tend to attract the exhalations and vapours which are generated, and are hence more unhealthy than the low grounds actually are. Thus we perceive that inundations even of sea water are here, as has been observed by Dr. Jackson with regard to the Savannahs of America, not productive of any marked degree of insalubrity, owing evidently to the perfectly sandy nature of the soil and the little admixture with it of vegetable mould or vegetable matter in a state of decay.

The sandy soil extends no farther than the sea coast. In the plains at the immediate feet of the mountains, in the valleys and in the ravines, the soil is a rich red or loamy earth. The principal towns of these provinces stand on the sea coast, and several of them are built upon the sandy downs, and are nearly insulated by the inlets of the sea,—and the salt water lakes, of which mention has been made. Fevers, dysentery, and hepatitis, are the prevailing diseases amongst Europeans; and fevers and ulcers of the lower extremities amongst the natives.

Cannanore is surrounded by small hills and narrow valleys of little depth, and is free from any reservoirs of stagnant water. Its soil is hard and dry, being principally composed of gravel, and sand, and red iron-stone or laterite. The country is open, and but partially covered with wood. Little or no disease is engendered here. The few cases of intermittent fever that do prevail during the months of November, December, and January, may be attributed to the malaria from the western Ghauts, conveyed here by the strong and penetrating winds which prevail during the night and early in the morning from that direction, in the three months noticed. The

more serious cases of remittent and intermittent fevers that have been treated in the hospitals at this station, have occurred in troops arriving from the Mysore country, and have been contracted in the Wynaud jungles. The graver forms of disease, such as hepatitis and dysentery, attacking the European soldiers, may, in nine cases out of ten, be traced to intemperance and dissipation, accompanied by too great an exposure to the heat of the climate. The venereal disease has, since the abolition of Lock hospitals, increased to an extent before unknown here.

Tellicherry is a station in lat. 11° 45′ N., and long. 75° 32′ E., about twelve miles to the south of Cannanore. It is thickly planted with cocoa-nut and other large trees, except on the bank of the river, where there are rice plantations, among which great numbers of the natives live. About the end of May the monsoon sets in from the S.W., gradually drawing to W. N.W., and terminates about the middle of November, after which the land-winds begin to blow regularly from E. or E.N.E., from eight in the evening until ten or eleven next day; and are as regularly succeeded by the sea-breeze from W.N.W. About the end of March the land-winds become faint, and the sea-breeze sets in strong from the W.N.W., blowing thus until the end of April, from which time the weather becomes sultry and unsettled, until the setting in of the monsoon. Very little sickness prevails in this station.

Calicut.—The town is said to have become more healthy of late since the removal of the fishermen's huts, and of the numberless and almost useless trees which previously surrounded it, and which has allowed a much more free circulation of the sea-air. During the months of November and December, 1833, the cholera prevailed both in the town of Calicut and amongst the prisoners in the gaol. Of the latter, twenty-three fell victims to the disease, the number attacked being thirty-four. In these months the weather was represented to be close and sultry, with heavy dews at night. The deaths in this gaol, as in most others, usually arise from diarrhœa and dropsy, the consequences of previous disease, insufficient nutriment, mental anxiety, and confinement.

Mangalore.—The town and cantonment are situated on a low flat at the mouth of the Naitravutty river, which communicates with the sea by a narrow outlet, the great body of water running along, and forming a kind of back-water. Cocoa-nut and jungle-trees completely obscure every habitation, and deprive the inhabitants of the benefit of the sea-breeze. The want of a free circulation of air gives rise to the formation of a dense stratum of malaria.

Trees of all descriptions have, within these few years, been planted wherever a vacant spot of ground could be found, and the immediate vicinity of the town and cantonment, viewed from an eminence, has the appearance of a dense wood. This, combined with the effluvia, arising from the black mud and decayed vegetable matter so plentifully exposed in the extensive rivers surrounding this place when the tide is out, will easily account for its unhealthiness, and the leucophlegmatic appearance of its inhabitants. Mangalore affords greater facilities to drunkenness, debauchery, and dissipation of all kinds than, perhaps, any other cantonment in India; and to this cause, rather than the quantity or price of fresh meat, or to the injurious effects of climate, may be attributed the debilitated and impaired constitutions of so many men in the military hospital.

Cochin was a Dutch settlement surrendered to the British in 1795. The town is situated on the border of one of the largest openings by which the sea communicates with an inland lake known by the name of the back-water. Although the houses are large, they are huddled together, ill arranged interiorily, and not adapted to a warm climate. There is also a deficient circulation of air from the walls which surround the various compounds attached to them. The soil is loose and sandy, and the whole town of Cochin is extremely damp. The principal diseases to which the inhabitants are liable are cholera, bowel complaints, fever, hepatitis, rheumatism, and elephantiasis. Of this latter disease, known even as the Cochin leg, the cases are extremely numerous; and from the report of superintending surgeon Underwood, not fewer than one tenth of the population are supposed to suffer more or less from this ugly, indolent disease. The swelling which, in the first instance, invariably succeeds an attack of fever, with pain and enlargement of the inguinal glands, is not confined, as is often supposed, to one leg, or to that space between the ankle and knee joint; on the contrary, in every street, and at every hour of the day, ample opportunities are afforded of observing that both extremities, from the toes upwards to the knees, and in the same individuals, frequently from the latter to the groins, together with the scrotum, are involved at the same time in the disease, particularly in those cases where the febrile attacks are frequent and severe; and, were it possible to ascertain the exact number who have contracted the affection, it is probable that nearly as great a portion would be found with both extremities increased in bulk from the toes to the knee joints, as where one alone is the seat of the disease. In some few cases, in addition to

the enlargement of the lower, one or both of the upper extremities also, are to be seen affected at the same time, and the motion of the fingers much impaired in consequence; but the bulk of the arms is not at all commensurate with that of the legs.

The disease appears to be confined, in a degree, to a limited distance from Cochin. In an easterly or northerly direction, where the population consists principally of ryots and others connected with agricultural pursuits, the Cochin leg is comparatively rare; whereas, in a southerly direction, along the neck of land running down from Cochin towards Aleppy, between the back-water and sea (the numerous villages of which are inhabited mostly by fishermen, whose style of living is similar to that of people in the same condition in life at Cochin) the disease is very common; but the further it is traced to the southward, the more it appears to decrease. Many of the natives of this place consider the disease to owe its origin to hereditary disposition; and frequently when it makes its appearance on any member of a family, the parents, when of respectability, generally endeavour to prevent the dissemination of the disease, by forbidding a matrimonial alliance. On the other hand, some of the most intelligent people long resident in the country, though they also lean to the opinion of the disease being hereditary, still are inclined to think that unless the tendency be very strong indeed, it is not called into action until, through some cause or other, the system becomes depraved, and the health disordered. Hereditary disposition, Mr. Underwood thinks, may probably be, in some degree, connected with the production of the complaint in a few individuals; but as it appears occasionally to attack natives from inland parts of the country, who have resided in this quarter for a few years, and in whom there could be but little suspicion of a tendency previously existing of the nature of that in question, there is reason to think that the Cochin leg in most cases, if not in all, derives its origin from the long use of the brackish water found in the town and its vicinity, and from the constant use, at the same time, of a diet, such as fish, toddy, &c., without a due portion of other articles, containing a requisite quantity of nourishment.

The Balaghaut, or Ceded Districts.—This country is possessed in general of considerable elevation, but not so great as that of Mysore. The southern portion consists of valleys, lying below the eastern Ghauts. The soil is in general rich, especially the black land, large districts and plains of which are to be met with, particularly in the western districts. This rich, black soil consists of a pure mould, from two to twelve feet deep. It contains no remains

and the northern extremity is marked by interrupted chains of hills, which run from the eastern Ghauts towards the western range of which Nundydroog is the highest, and the hill fort of Nidigul the most western.

Dr. Heyne, who was attached to the Mysore survey, states, that the hills running north and south, or in a direction parallel to the two coasts, belong all to the primitive class of rocks, as far as he had examined them; and consisted of syenite, mixed here and there with granite, and the floets mountains were observed crossing the country, and joining as it were the primitive chains to each other; but the deviations were by no means uncommon, for sometimes primitive mountains run east and west, and floets north and south; but in general they would be found as he had stated them.

The soil in the high ground is generally red and gravelly, and appears to contain iron and a large portion of the ingredients of the decomposed rocks of the neighbourhood. The parts that are properly cultivated appear fertile, but the valleys are particularly so; the soil consisting of a rich loam near the hills, and in the neighbourhood of the rivers, of a rich black and vegetable mould.

The principal rivers in Mysore are, the Cavery, or Cauvery, the Vadevutty, the Hennavutty, the Cubbany, the Shimsha, the Arkavutty, and the Penaukeny; the two latter run almost the whole length of the country, rising from Nundydroog hill, in the north, and flowing into the Cavery nearly at the south extremity. The waterfalls of the Cavery, as it descends into the Coimbatoor country, are said, at certain seasons, to equal, in effect and grandeur, any in the world.

Mysore participates in two monsoons, namely, the S. W. from June to September, and the N. E. from September to December. In January and February the wind blows generally from the south, and the mornings are foggy, but on the whole they are healthy and pleasant months. March is sultry; and in April and May, the most disagreeable season of the year, the winds are changeable, blowing strong and dry in the morning from the west, and in the afternoon from the east, which latter wind generally brings rain, accompanied with thunder and lightning, the thermometer ranging from 60° to 90°.

The climate is cool and moist, but subject to sudden variations of temperature, and the difference between day and night extreme. To these vicissitudes may be attributed the prevailing diseases.

The island of *Seringapatam*, on which is built the capital of the province, and one of the chief fortifications in India, is formed by the separation and re-union of the river Cavery, and is situated

upwards of 2000 feet above the level of the sea. What is termed the small island, is formed by another division of this river, immediately to the westward. This island lies in a deep valley, bounded, with some variation as to distance, by two large nullahs; and the surrounding country, in every direction, exceeds it greatly in elevation, rising in high hills on every side of it, excepting at the places where the river enters into and passes out of the valley. Seringapatam being under the influence of both the N. E. and S. W. monsoons, rainy weather prevails from the beginning of May until the commencement of December. January, February, March, and April, are dry and sultry. From the middle of December till the beginning of February, cold and bleak N. E. winds prevail; and between this period and the commencement of the S.W. monsoon, is the hottest season. A damp atmosphere and heavy dews prevail more or less throughout the whole year, but more particularly during the months of January, February, March, and April. The variation of temperature between the day and night is also greater at this season.

The soil on that part of the island on which the fort is situated is dry and rocky. The high ground about Shahar Gangam is a light gravelly and red soil. The south side of the great, and the centre of the little island, together with all that space bounded by the nullahs, consists, with little variation, of a deep, black coloured, and loamy earth. During the monsoon months water is found by digging ten or twelve inches from the surface near the river; and the whole space bounded by the nullahs, together with the south side of the great, and the whole of the small island, being appropriated to wet cultivation, forms a continued swamp for several miles around the island.

The months of March and April, or a little before the setting in of the south-west monsoon, and the month of October at its close, are the most unhealthy periods. During these months the winds are variable; and, from whatever quarter they may blow, must pass over the marshy fields which surround the island. During the south-west monsoon, the south-west side generally suffers the most from the endemic of the country. The fort, although the accommodations in the barracks and hospitals are by no means so spacious or so well ventilated as may be considered desirable, is upon the whole the healthiest part in the island and immediate vicinity. The accommodations for the native troops are unobjectionable. At the time I visited Seringapatam there were several stagnant pools in and about the ditch; besides other

nuisances, giving rise to offensive exhalations, extending almost to every quarter of the fort. These were recommended to be remedied in an official report. The character for unhealthiness bestowed upon Seringapatam, as respects both European and native constitutions, has always had the worst effect upon both descriptions of troops stationed here, particularly soon after their arrival; dread of disease proving, as it always does, the most efficient predisposing cause of its supervention. Seringapatam has, therefore, for some years past been prudently abandoned altogether as a station for European troops.

The town of Mysore, the former capital of this province, is in lat. 12° 18′ N., long. 76° 42′ E., at an elevation above the sea of about 2450 feet, distant 294 miles W. by S. of Madras, and 120 miles from Cannanore, the nearest principal station on the Malabar coast; 9½ miles from Seringapatam, situated in a declivity formed by two nearly parallel ranges of more elevated ground lying north and south; the western forming the more immediate acclivity and lying more uniform, the eastern being a gentle ascent—the northern point of either converging, or rather being lost in each other, forming the highest ground on which the northern extremity of the Pettah lies—and the commencement of the declivity above mentioned, as well as the point along which the northern boundary rampart runs east and west, and from which there is a gradual descent to the southern boundary towards Nungangode. The fort, a square, three sides of which are each about 450 yards in length, the northern side more. It is distant nearly a mile and a half from the Mysore hill. The fort wall is formed of good stone masonry, with several bastions, and two deep ditches all round, except on the east or tank side. The height of the wall is considerable, being nearly as high as most of the houses inside, which are generally two-storied. There is a sloping glacis, varying in breadth from 100 to nearly 200 yards round their sides; the eastern is washed by an artificial piece of water, confined by an embankment of upwards of 1000 yards, continued from the S. E. corner of the fort in a S.E. and S. direction, under which the great southern road lies. From this embankment to the western boundary, is occupied by Brahmins, and numerous gardens are irrigated by the above tank. The Pettah lies to the N.W. and N. of the fort, chiefly the latter, which is the most extensive and thickly populated part. The fort is as thickly inhabited as it is possible. The centre of the western, a somewhat elevated part, is occupied by the rajah's palace, which is a large building, forming

three sides of a square facing the east. There is a pagoda at the south-eastern corner; the rest is filled with good substantially built houses. In the Pettah there are many good substantial houses two or three stories high, the streets laid out with regularity, the principal ones at right angles; the houses are generally covered with tiles, but some of the best are terraced. The number of houses in Mysore, including the fort, in 1836, amounted to 9558, and the population is estimated at 65,000, of whom about 14,000 are Mahomedans, and 12,000 Brahmins. The fort is, like all other native forts, crowded and filthy; but, being on a sloping surface, the rain assists in removing nuisances.

The climate is cool, the average annual temperature 76°, the prevailing winds N.E. and S.W.; the former from October to May, the latter from May till October. The south-western monsoon is that which affords the chief annual supply of water, and the principal months of rain are June, July, and August. There is also rain in October and November from the N.E. monsoon. The winds from December to April are high and disagreeable, though in December and January very cool. They are remarkably dry, and furniture, which has stood the Carnatic and ceded districts, cracks and splits in these months. Fogs prevail much in the mornings at Mysore after the south-west monsoon, and till January; but the country south of Mysore would appear to be more liable to them than Mysore itself—possibly affected by two extensive ranges of hills—the Bilgeerungaum, lying N. and S. distant to the east about thirty miles, and the Neilgherries and some lower ranges, about forty miles south.

The extensive plain south of the Chaumundie hill, lying between the above ranges, is frequently covered with thick white fog, when the space to the north is free from any. Mysore is liable to fever, like Bangalore and all other stations in that country. The type chiefly intermittent, though sometimes remittent, which terminates in dropsy and affections of the spleen. The most sickly period is at the commencement of the S.W. monsoon, when after continued drought and heat, the moisture, from the commencing rains, effect decomposition of vegetable and animal matter, and give out noxious exhalations from the soil in great abundance. The next period of sickness is at the termination of the monsoon and setting in of the cold weather, when fevers of a milder type, rheumatism, and bowel complaints commence. Scrophula is common among the natives: no disease from manufactures. The manufactured articles in Mysore are cumblies of a superior texture, muslin, coarse

cloth, white sugar, jaggary, sago, opium, sealing-wax, raw silk, and iron. There is abundance of cattle and sheep in all parts of Mysore. They are diminutive in size, except in one district, the Kakanhully, where good draft bullocks can be procured.

Chittledroog, a town and fortress in the district of the same name, in the north part of this province, stands on one side of a considerable plain, surrounded by rocky, bare hills, on one of which the fortress is erected. The plain of Chittledroog consists of a black soil. The water is of a bad quality, which has been attributed here, as well as in other parts of India, to the filthy habits of the Hindoos, who wash their bodies, clothes and cattle, in the same tanks and wells whence they take their own beverage. The neighbouring country is unhealthy, although it is dry and open. This is imputed by the natives to the black and rich soil; and from my own observations I consider their inference to be correct. This fortress is about 2300 feet above the level of the sea.

Serah, a town in the western part of this province, is about 2200 feet above the level of the ocean, and is, as well as Chittledroog, situate in the Seringapatam valley. The climate is dry, but by no means healthy; and has, therefore, been long since relinquished as a military station.

Nundydroog, a strong fort built on the summit of a mountain, about 1700 feet high, and inaccessible in three-fourths of its circumference, is situate on the table-land of Mysore, and is one of the healthiest stations in this province. The surrounding country is hilly, but fertile, and admitting of high cultivation.

Bangalore, a very large fortified town, in the east quarter of this province, and the principal military cantonment in this part of India, is also on the table land of Mysore, and is about 3000 feet above the level of the sea. This is one of the most temperate and healthy places in the Indian peninsula. The country is dry and open. European fruits and vegetables grow here abundantly, if care be taken in their cultivation.

Bangalore is in lat. 12° 57′, and long. 77° 44′ E. It is the head-quarters of the division. The cantonment of Bangalore runs nearly east and west, and is laid out with great regularity. The parade is a beautiful level piece of ground, situated nearly in the highest part of the cantonment, and is partly surrounded by officers' houses, and partly by public buildings: on the north side running east and west, and parallel to the parade are the European cavalry barracks, the European infantry barracks, and the places of arms of four native regiments. In the rear of the dragoon barracks,

or rather to the N. E., are the lines of the native cavalry, and in the rear of the European infantry barracks the general bazaar.

The European officers of the native infantry generally reside in streets which run parrallel to the parade, but in rear of their place of arms, and further north, and in the lowest part of the cantonment, are the hospitals and hutting ground of the native regiments. The officers' bungalows on the south extend from the horse and foot artillery lines, which is to the eastern boundary of the cantonment to the extreme west on which side the parade is open. The bungalows to the south are principally occupied by her majesty's officers and the staff.

The lines of the native regiments are west of the European infantry barracks, and are built on a declivity. The hospitals of native corps are situated immediately in rear of the officers' houses, and in front of the lines or hutting ground, being several feet below the level of the parade: they are close and confined, from the number of buildings in their neighbourhood.

The native lines are situated in the lowest part of the cantonment; but from being placed on a declivity, and from a peculiarity in the soil, which becomes of a rocky hardness in the thoroughfares, the water speedily runs off, carrying with it all impurities, and consequently they are much healthier than their site would otherwise indicate.

Wells are found in every compound, but in many the water fails in the dry months, and in others it is brackish at all times. The great body of the people as well as the troops depend mostly on the tanks: many European and a variety of Indian fruits and vegetables thrive luxuriantly at Bangalore.

The climate of Bangalore, although very pleasant, does not always agree with persons on their first arrival, or until they have resided there some time; the cause of this is not explained: most persons on their arrival experience headaches, and various symptoms of indigestion; but in general these go off after a few weeks' residence, though not always. Rheumatism is a common disease; the careless manner in which soldiers and others expose themselves, when heated, in that climate, may account for this.

While the strong winds prevail in February, March, April, and May, it would appear that ulcers and even simple wounds are difficult to heal, and that a marked improvement takes place on the first fall of rain. For any disease of the respiratory organs the climate of Bangalore is unfavourable. An irregular intermittent fever, approaching frequently to a bilious remittent, is the scourge of

Mysore; it appears annually in some parts of the division between the months of January and August, and is seldom found two years in the same place. In 1836 it nearly depopulated the village Ooscottah, which lost about 4000 of its inhabitants; some of the villages in the neighbourhood suffered but in a slight degree: there was great irritability of stomach, and the febrile paroxysms extremely irregular. Quinine was given without effect, but it gave way at once to mercury, and in the subsequent attacks where the paroxysms were more regular, and the remissions more distinct, the sulphate of quinine completely controlled it.

In the province are many hill forts, several of which are unhealthy, owing to the hills and ravines being covered with woods and jungles: indeed, all the mountainous and hilly districts of this country are more or less subject to endemic fever, generally of the remittent and intermittent types. From the returns to the Medical Board of the diseases of the Mysore division of the army, during six years, including also the stations in Malabar and Canara, the annual average of fever amounted to about 27 per cent. *actual* admissions in the effective strength of the European troops, to 22½ per cent. of dysentery, and 18 per cent. of hepatitis. The prevailing disorders amongst the sepoys were fevers and ulcers: the former were as high as 47 per cent. in the effective strength, the latter nearly 9 per cent.*

Salem and the Barramahal.—The surface of this province is greatly elevated, forming a part of the table land above the eastern Ghauts. The seasons and climate are very nearly the same as in Mysore. There is much waste land and jungle in this part of the country. Indian corn and rice are the principal grain cultivated. A considerable quantity of cotton is annually produced, both here and in the adjoining territory of Coimbatoor. Owing to the great elevation of the country at its northern quarter, the climate is cold during the rainy season, and therefore much deserted by the natives. Salem, the principal town of the district of the same name, is situated in the middle of a valley, and surrounded by mountains. It is upwards of 900 feet above the level of the sea. Ryacottah, a fortress on a high rock in the Barramahal district, enjoys a very temperate climate, owing to its great elevation. During the hot season, the thermometer seldom rises above 82° Fahrenheit. This is one of the most healthy stations in this part of the country.

Hyderabad.—The surface of this province is hilly, but not

* See the Tables in the Sketches of the Diseases of India, &c.

mountainous: it is an elevated table-land; hence its temperature is lower than the latitude indicates. The city of Hyderabad is situated on the south side of the river Mosee, in lat. 17° 15′ N., and long. 78° 35′ E. It is about three miles and a half in length and three miles in breadth, surrounded by a wall, and fortified. The population consists of about 300,000 souls. The river Mosee, like most other rivers in India, is, during a great part of the year, nearly dry; but after the rains it is full and rapid. At the city of Hyderabad, and in the country northward, the thermometer, during the cool season, is often as low as 40° and 45° Fahr. To the south, the country is thinly inhabited, and covered with much jungle, although the country is fertile. The S.W. monsoon usually commences about the beginning of June, and continues, with some intervals, till the middle of October. During November and December the sky is generally cloudy, the winds easterly; and sometimes, when the N.E. monsoon is heavy, a considerable quantity of rain falls. Dews are frequent during January and early in February; but both these months, and March, April, and May, are dry. The annual fall of rain is estimated at thirty-two inches. The mean monthly temperature, in-doors, may be considered nearly as follows:—January, 73°; February, 75°; March, 82°; April, 89°; May, 90°; June, 86½°; July, 81°; August, 79°; September, 78°; October, 78°; November, 75°; December, 73°; giving an annual mean of nearly 80°. This is perhaps a little higher than the thermometer, placed in a more exposed situation, may have indicated. The daily range of the thermometer is often very considerable, particularly during November, December, January, and February, amounting, in the shade, generally to about 20°, and not unfrequently to 30°.

Secunderabad.—The cantonment of Secunderabad is situated on a high ridge of land, about six miles north of the city, and about 1850 feet above the level of the sea. It is supposed to contain a population of 50,000 souls, exclusive of the troops, and lies in a direct line east and west about three miles, presenting various irregularities of surface, some portion of the ground, occupied by the troops, being in bottoms, while others are considerably elevated. The general aspect of the country is wild, sterile, and picturesque, interspersed with hillocks of granite rock heaped together in a variety of strange and fantastic shapes;—the soil is chiefly silicious, particularly on the high ground; and, on its surface, many of the scintillating stones are to be found, such as quartz, agate, calcedony, flint, rock crystal, felspar, and mica. There are two very

remarkable granite rocks to the N.E. of the cantonment of a semi-spherical shape, about three miles asunder, and there are no other hills near them—they both rise to a considerable height, and have buildings on their summits, containing the graves of some holy fakeers; and, in these buildings, fakeers reside in charge of the sacred depositories. The nearest to the cantonment is called Mowlali, and has a greater base and altitude: the other is Im-maum Zamin, and is less as regards its base and elevation. At these hills, particularly the former, religious meetings are held annually, at which immense numbers of people attend. On the N.W. of the city of Hyderabad and S.W. of the cantonment, about six or seven miles, is the hill fort of Golconda, and the celebrated and splendid tombs of the sovereigns of the Dekkan.

The whole face of the country is studded with large tanks of water for the purpose of irrigating the land, which, without the supply thus afforded, would be arid and unproductive. These tanks are of all shapes and sizes, from a few yards to many miles in circumference; rice cultivation extends for several miles, sometimes without interruption, and sometimes the paddy fields and tanks alternate with each other in succession until the water is exhausted in the river Mosee, near the city of Hyderabad. All the varieties of *palm trees*, which produce that intoxicating beverage called *toddy*, are to be found over the whole face of the country in great abundance.

The Hoossain Saugur tank, an immense sheet of water, several miles in circumference, lies between the city of Hyderabad and the cantonment to the N.W. of the city, and S.W. of the cantonment, and formerly gave name to the cantonment itself. Along the edge of this tank a high bank has been formed called a bund, over which the high road runs from the cantonment to the British residency and the city. To the eastward of this tank, and in rear of the cantonment and bazaar, there is a very extensive line of rice fields, extending eight or ten miles to the village of Oopal on the Madras road, where the waters of these rice fields run into the Mosee river. The fogs which collect, morning and evening, along the whole tract of this low swampy rice cultivation, is so thick and dense as frequently to obscure the city from view, with the exception of the minarets, which may be seen rising up in the midst of it; indeed, the fogs over the western part of the cantonment, in the immediate vicinity of the Hoossain Saugur tank, are very great, it being considerably lower than the eastern part of the cantonment. At the lowest part of the cantonment, on the left of the line, are

the barracks of the horse-artillery, which nearly face the church on the eastern or right extremity of the line, and are close upon the bank of the Hoossain Saugur tank. Paddy cultivation is carried on within fifty yards of the officers' houses in this part of the cantonment; and, during the subsidence of the water, fevers are here very general. The hutting ground for the families of two native regiments is immediately in this neighbourhood; and it may not be out of place to observe, that the sepoys generally live with their families in these houses, and not in what is called their barracks, which are, in fact, merely places of arms.

The cantonment faces the north on the high ridge already noticed, and the general parade is on the northern slope of this ridge, extending nearly the whole length of the cantonment, and is about half a mile in breadth, on an inclined plane, descending about two inches in a yard, bounded to the north by a small rivulet, over which is a one arched bridge leading to the lines of the artillery, the cavalry lines of Bohenpully, and the cantonment of Bolarum. The arsenal and place of arms for native regiments is built upon the parade, thirty or forty yards in front of the officers' quarters; the arsenal, a large imposing building, being in the centre, and the native barracks extending right and left from the centre, nearly the whole length of the cantonment. The place of arms are two for each regiment, one for each wing: between them is another building for stores and quarters for non-commissioned European officers, and on the flanks of each respective barrack is the regimental hospital. In the rear of the parade are the officers' houses, forming a long street from one end of the cantonment to the other: the houses are built upon each side with small compounds attached to them. About two furlongs in the rear of and south of the officers' houses, is the general bazaar, which runs parallel to the parade, east and west, and extends in length about three fourths of the cantonment, and is well supplied with every essential. The bazaar is considerably lower than the officers' houses, and close to that extensive range of rice fields already noticed; liable, of course, from their proximity, to all the inconveniences arising from such locality; and I have reason to know, that fevers among the natives who reside here are by no means uncommon.

On the eastern extremity, and right of the cantonment, a little in advance of its front, stands the church, a large and handsome building upon the highest ground in the cantonment. To the south of this, and in rear of the officers' houses, stand the European infantry barracks and hospital; nearly on a line with the bazaar, and

at no great distance from the swampy paddy fields already noticed. The barracks, though not upon the lowest part of the cantonment, is situated in a deep hollow, and enveloped in a dense fog from evening till after sun-rise in the morning, so as to completely obscure them even from the hospital, which is built upon the rising ground in the vicinity, and not more than 250 paces distant. The barracks are not visible from the northward, unless approached very near, when they look as at the bottom of a basin. On the S.W. where the hospital is built, the elevation from the barracks to the hospital is more sloping and gradual; while, in the opposite direction, the elevation is almost perpendicular, and is well protected from the winds; but completely exposed to the S. and S.W. winds which blow over the extensive rice fields, extending from the Hoossain Saugur tank to the village of Oopal, on the Madras road.

For these reasons I have always been of opinion that the site of the barracks has been injudiciously selected; and it is an undeniable fact that the mortality has been greater among the European troops who have occupied these barracks at different times from 1803 to 1837, than in any other part of the army. The subject has already undergone considerable discussion in India; and at present I shall merely observe that it is well deserving the attention of the public authorities in England and in India.

The artillery barracks are situated about two miles due north of the cantonment, on a high healthy position, and the cavalry cantonment at Bohenpully, about two miles north of these lines is in a low situation, but not reputed unhealthy, though they have had at times considerable sickness.

The country of the Dekkan is, generally speaking, an elevated table land, hilly but not mountainous; the hills are chiefly composed of granite, which has the appearance of having been dislocated by some powerful force; the masses are of all sizes and almost always quite bare and weather-worn, thrown into the most fantastic and irregular forms; the face of the country is rough, rocky, and sterile, consisting of a succession of heights and hollows of a great variety of extent; the hollows or valleys are generally formed into lakes or tanks by blocking them across with strong mounds (called bunds) of stone or earth for the purpose of irrigating the land.

The climate of Hyderabad is productive of fever amongst the natives, generally of the remittent type, though sometimes it assumes the continued form. In hot weather, when the temperature is more uniform and the exhalations from the soil exhausted,

fever is less prevalent than at other seasons and assumes more the continued form. During the rains, when the weather is cloudy, the temperature is moderate and tolerably uniform; but sometimes there are intervals of dry and very hot weather, causing considerable exhalations and producing intermittents. The most unhealthy period of the year is between October and December, when exhalations are rapidly raised by a powerful sun and the alternations of temperature in the course of twenty-four hours are very great and variable. It is at this period intermittents chiefly prevail: coughs, colds and rheumatism, the usual results of such a state of weather, are almost universal; bowel complaints occasionally arise amongst the natives, but they are seldom severe or protracted.

In the hot season, commencing in March, the temperature is lower than might be expected from its latitude, the hot winds being more temperate than they are farther north, or even in many parts of the Carnatic; the rains in the S.W. monsoon generally commence the first week in June with extremely heavy and partial showers, which in a few days reduce the temperature many degrees. The rain is extremely uncertain: weeks sometimes elapse during the monsoon with scarcely any rain, succeeded by such heavy showers that in the course of forty-eight hours many inches fall. About the middle or end of October clouds collect from the N.E. which are generally followed by heavy rains from the monsoon of that quarter. The general average of rain that has fallen in the years 1833, 1834, 1835, and 1836 is about thirty-one inches. In November the cold weather commences, and the temperature is much reduced: the coldest periods occur in November, December, and January, and in February the thermometer begins to rise. The greatest degree of cold is principally in the morning, from day-break to half-past eight o'clock, and from sun-set, during the night, great variations of temperature occur, not only in the general range of the thermometer, morning, noon, and evening, but from the temperature occasionally not sinking to the usual degree during the evening and night,—a circumstance produced apparently by clouds collecting from the N.E., and reflecting the radiated heat, and at other times by the wind becoming southerly.

Bolarum is a cantonment situated about thirteen miles to the N.E. of Hyderabad. It is in lat. 17° 21′ N., long. 78° 37′ W., and forms the station for the troops of the Nizam. It has been remarkable for its salubrity and its exemption from the periodical visitation of fever experienced at Secunderabad. The lines are built on a granitic ridge 1800 feet above the level of the sea, and

sixty feet higher than Secunderabad. This ridge is bounded on all sides by paddy fields, and there are several small tanks for their irrigation, scattered about the vicinity. There are no villages of any consequence in the neighbourhood. The gardens produce almost all our European vegetables in great perfection; and besides the common Indian fruits, there are the finest kinds of mangoes, peaches, grapes, strawberries, and pine-apples, in abundance. The range of the thermometer throughout the year may be stated at 49° to 90°, in the shade, rarely higher than the latter in the hot months. In June, July, August, and September, westerly winds prevail; during October, November, December, January, and February, the winds are from the east; and in March, April, and May, north-westerly breezes predominate. The annual supply of rain may be estimated at twenty-five to thirty inches, and is principally derived from the S.W monsoon, which commences in June and ends in October.

Bolarum may be considered as a very healthy station, as invalids are constantly in the habit of resorting to it for change of air, and with the happiest result. No rank vegetation is permitted within the limits of the cantonment, the hedges being cut down every year.

Aurungabad.—The surface of this province is very irregular, and in general mountainous, particularly towards the western Ghauts, where the hills rise to a great elevation. Rice is the grain which is principally cultivated. The city of Aurungabad contains about 60,000 inhabitants. On the north it is bounded by marshy ground, beyond which is a semicircular range of hills of considerable elevation. The central parts of this city are nearly on a level with the marshy ground. Tanks of water abound throughout the town, as well as in its vicinity, from which fœtid exhalations arise towards the end of the dry season. The soil on which the city stands is alluvial, and of very considerable depth. The military cantonment is situated upon a rocky plain, about a mile S.W. of the city. The hospital is in an airy situation, is well-built, and has sufficient accommodation for 200 sick. Mr. Young states, that the cantonment must be "considered healthy, as the average number of sick, in each native corps of nearly 1000 men, has not for some years been above thirty. This, when contrasted with the state of disease in the city, is most striking, and points out the vital importance which ought to be attached to the selection of proper locations for cities, as well as for military cantonments."

Jaulnah, an important military station and large cantonment, in lat. 19° 45′ N., and long. 76° 34′ E., is situated on the left bank of

a small river called from the name of the district Khoondulga, and is elevated about 1700 feet above the level of the sea, forty miles to the east of Aurungabad, 250 miles N.W. of Hyderabad, and about the same distance from Bombay in a N.E. direction, and from the sea in a direct line of about 210 miles. The cantonment is situated upon a gentle sloping declivity on a very extensive plain, nearly surrounded by a small range of tabular trap hills, forming a sort of amphitheatre. The cavalry lines are on the S.E., the horse and foot artillery on the N.W., and the infantry in the centre. The town of Khadarabad (a walled fort), lies within half a mile, and that of Old Jaulnah within two miles of the cantonment, in a S.W. direction. The Khoondulga river separates the town of Khadarabad and Old Jaulnah, and forms the boundary of the cantonment. The table-land in front and on each flank, is of the trap formation, elevated about 150 feet above the soil, and in various stages of decomposition, over which is a red gravel of a lateritious character, mixed with lime. In the ravines (of which there are many), large pieces of quartz, carbonate of lime and pieces of silex, of various tints, are found, many of which would appear to contain copper or iron. A brown ochre is also found here, which upon exposure becomes redish, and is frequently used by native painters as a body colour, in conjunction with other pigments, for various purposes. The soil upon which the cantonment stands, is the black cotton ground, which, when wet, becomes so adhesive, that it is almost impossible to walk over it, and when dry, breaks into large deep fissures of considerable depth; but produces every description of vegetable in the greatest abundance, and in the highest perfection. Indeed the climate of Jaulnah is admirably adapted for the purposes of horticulture; most of the European vegetables are raised in great perfection. Figs, grapes, peaches, and strawberries, are all excellent in the season; and I have seen some of the latter rival any in England, but somewhat deficient in flavour.

The climate is generally considered healthy: the monsoon commences about the middle of June, and the rains continue till August, when it commonly clears up for ten or twelve days, they then commence again, and terminate in September. The prevailing winds during the rains vary from S.E. to S.W. In October falls of rain sometimes occur, but they are never heavy; and, from this period till the month of March the climate is delightfully cool, often cold, and the winds easterly. The months of April and May are unpleasantly hot, land winds blowing with great violence; but the nights are generally comparatively cool and pleasant.

The months of April and May have been considered as the most unhealthy for Europeans; fever, dysentery, and liver disease, being frequent. In the months of August, September, October, and November, fevers have prevailed to a considerable extent amongst the natives, principally intermittents.

The variation of temperature in this climate is considerable; the thermometer has been known to range during the night from 38° to 42°; during the day, under cover in houses, from 68° to 79°; and in the sun from 98° to 120° and 160°. The most prevalent disease is fever, both remittent and intermittent, but chiefly the former, arising from atmospherical vicissitudes and exposure, the climate being particularly liable to sudden changes, which, though not always observable by variation of the thermometer, is yet very perceptible to the feelings. It is obvious, therefore, that in such a climate great attention should be paid to the clothing and comfort of the troops, both European and native.

Nagpoor, the capital of the Gundwana province, is extensive and populous, containing upwards of 100,000 inhabitants. The streets are narrow and filthy. It is situate in a plain, is about 1000 feet above the level of the sea, and is open on all sides, except the west, where there is a low range of tabular trap hills. The soil consists of a black earth. Cotton is extensively cultivated. The general character of the whole country for many miles around Nagpoor is very much alike. The country is considerably elevated, particularly the parts nearest to Malwa; and there is a gradual descent thence to the sea coast of Orissa and the Northern Circars. The soil is black and stony, covered with scattered jungle, and in some parts with excessively long grass. The jungles and grass are generally, through the night and morning, covered with dew, the evaporation of which makes the cold considerable, particularly in the morning. The seasons are similar to those of Central India. The nights and mornings are generally cool throughout the year, and the variation of temperature is very great. From November to February the thermometer ranges from 50° to 90°, and sometimes it rises above 100°.

The prevailing diseases are fever and dysentery, particularly the former. During the years 1816, 1817, 1818, 1819, and 1820, the cases of fever averaged annually 82 per cent. in the effective strength of Europeans and 51 per cent. of the sepoys; but this high per-centage of disease arose from the greater exposure of part of the force whilst on service, particularly from marching during the mornings and evenings, when the exhalations from the jungle, and the eva-

poration of dew from the long rank grass so abundantly covering the country, rendered the air cold and unwholesome. In later years the per-centage of fever has been much less, which is chiefly owing to the troops having been stationary in the most open and healthy parts of the country. Fevers are the endemic of Nagpoor and the adjoining districts. Hepatitis is, upon the whole, less frequent here than in most other stations in India; and dysentery, although prevalent, is as much to be imputed to the habits and indulgences of European soldiers as to the climate. During the rains, and for some time afterwards, the fevers are purely intermittent. As the air becomes drier and colder the remittent type is most frequent; and during the hot season they assume the continued type, and are oftener accompanied with disorder of the abdominal viscera.

As a military station, Nagpoor was first occupied by the Madras troops in 1816, and continued as such under the Madras presidency until 1820, when it was transferred to the Bengal presidency. From the year 1816 to 1820 barracks were erected near the residency in a most unwholesome position, and where sickness prevailed among the troops to a great extent. On the Madras troops being relieved by the Bengal army in 1820, a new ground was taken up at Kamptee, a few miles from the residency, where the troops became comparatively healthy. It is situated upon black cotton ground, extending along the river Keernah east and west, about 4½ miles. The roads through the cantonments in all directions are well raised, and thickly covered with gravel and sand to keep them dry and good. Nagpoor was again restored to the Madras presidency in 1826 or 1827, and continues one of their frontier stations.

SECT. VI.—*On the Diet and Regimen usually adopted by Europeans on their Arrival, and during their Stay in India and in Warm Climates generally, as predisposing and exciting Causes of Disease.*

Having treated of the probable causes of diseases in warm climates, and considered them as respects their general sources and modes of operation on the European constitution, and also as to the conditions and circumstances under which they present themselves in particular situations and localities, I now proceed to inquire into some of those probable causes which predispose the

system to be acted upon by the more energetic agents of disease which occasionally co-operate with them towards the production of morbid actions, and which not unfrequently are, of themselves, productive of disorder.

There can be no doubt that terrestrial exhalations, as already shown, are a very fruitful source of disease, particularly in warm climates, where the changes of temperature are sudden and great, and where the atmosphere is often loaded with moisture under an oppressive and burning sun, exhausting the general energies of the system, and impairing the powers of digestion; and, as many of the most formidable diseases in India are found to be dependant on plethora, it may not be amiss here to show how this condition of the vascular system is produced. If food be taken into the stomach of a quality and in quantity suitable to the vital energies of the system, it is changed into a healthy chyle, suited to the repair of the frame; but if the appetite be excited so as to receive more than is necessary for the wants of the body, and if inadequate means be resorted to, to procure the secretion and excretion of what is superabundant or noxious, a plethoric state of the vascular system must be the consequence; and this state will be productive of active disease in some important viscus, particularly in warm climates, in those viscera which are more especially influenced by the very efficient sources of disease already alluded to.

Whether the quantity of food generally taken by European residenters in warm climates be too great, and whether the beverages usually resorted to, are such as the wants of the system demand, and no more, I shall now proceed to inquire; and afterwards endeavour to ascertain how any excess of food or drink beyond what is necessarily called for, becomes productive of that particular condition of the vascular system in which the majority of intertropical diseases originate, and without the previous existence of which the more immediate causes of these diseases,—viz., those which proceed from the soil,—would be less frequently productive of their usual effects upon the European constitution.

In order to convey a correct idea of the mode of living in India, it is necessary to detail the usual routine of a single day, observed by the European orders of society:—The military officer goes to parade at six o'clock, A.M., and breakfasts between eight and nine upon tea, coffee, or cocoa, with fish, meat, eggs, rice, and whatever may be most agreeable to him. From breakfast till one o'clock he generally applies to study or amusement, or to paying visits. The heat of the weather, and perhaps a hearty breakfast, and the

nature of the articles taken at it, produce thirst, which renders the necessity of gratifying it urgent, and occasional draughts of wine and water, beer and water, or brandy and water, are therefore necessarily taken; and although this is by no means a habit, nor is indulged in beyond what seems a matter of necessity, yet it must, in a certain degree, be injurious. At one o'clock he eats a hearty tiffen (luncheon), consisting of roast and boiled meat, fish, mulligatawney or other soups, various wines, bottled beer, &c. He afterwards occasionally rides out in the sun, lounges on a sofa, or amuses himself with cricket or fives till evening parade. Dinner is next disposed of, at seven o'clock, or half-past seven, or eight. This meal is generally profuse, consisting of soups, fish, rich and hot curries, roast and boiled meats, and other richly-made dishes, with various wines, and bottled beer. To all this succeeds coffee or tea; and upon the repleted stomach and excited system he retires to bed at eleven or twelve, when the feverish collapse induces the sound sleep indicating plethora, or the restless slumbers attendant upon prolonged excitement.

The same system, which is pursued daily by the military man, and which is varied, of course, according to the habits and disposition of the individual, is followed, with but little variation, by the civilian. The latter rides, in the cool of the morning, from his country-house to his office, where he generally has tiffen at the usual hour, and rides home again in the cool of the evening to dinner, which is usually upon the large scale already noticed.

Thus it will be seen that animal food is partaken of very generally at three meals daily, and always at two of them; and when we consider that this species of food contributes most powerfully to the production of a plethoric state of the vascular system, the foundation which is thereby laid for disease is most sure, and, when inquired after, most apparent. In order to trace more clearly the bad effects of over-feeding the body, it may be useful to inquire into the nature and tendency of the various articles of food and drink usually adopted by the European residenter in India and warm climates.

The hot and highly spiced soups which are usually taken in warm climates, both to tiffen and dinner, are hurtful to the functions of the stomach and liver. They serve to distend the former viscus, to induce an excited state of its mucous surface, and to increase the quantity of the fluids absorbed and carried into the vascular system. Owing to the intimate nervous connection existing between the digestive canal and the liver, they also tend to stimulate the

latter viscus, and to induce, by the frequent and daily repetition of the stimulus, an inflammatory state of its vessels. Soups, moreover, of this description are themselves difficult of digestion, particularly by weak individuals, owing to the circumstance of their over-diluting the gastric fluids; and they not unfrequently impede, from the same cause, the digestion of other substances taken about the same time. The same observations equally apply to highly spiced curries and sauces; these also tend to irritate or excite the stomach and liver, and to stimulate the palate and appetite, so as to lead the individual to partake of more than the functions of the digestive organs can dispose of in a healthy manner. To all these excitements are usually added, at three meals each day, variously prepared dishes and beverages,—so that when the appetite is cloyed by one, it may still relish some other; and hence a much greater quantity of food is usually taken than can be well digested; or, if digested, than the wants of the system require. To the allurements which variety presents, are added, at no less than two meals daily, those which various wines and beverages offer. These latter are indulged in, and they impart their aid to the various spiced dishes, sauces, and curries, in stimulating the stomach to receive more into it than it can properly dispose of, and in exciting and promoting an inflammatory action of the vessels of the liver and mucous surface of the digestive canal. Thus it will be perceived, that the articles of diet, and the great variety of them, together with the wines which are used in warm climates, more especially in the East, have a direct tendency to excite the stomach and liver, and to induce inflammatory action in these viscera particularly; that, at the moment of their being taken, the appetite is roused by them beyond its natural and healthy pitch; that hence they are usually taken in great excess, or much beyond what is requisite to the wants of the system; and that, as soon as the artificially roused excitement of the digestive function subsides, the organs employed in the operation are inadequate to dispose, in a healthy manner, of all which has been taken, and on which they have to act; and hence an imperfectly digested chyle is formed, which vitiates the whole circulating mass, excites the system, and assists in the generation of disease. A large portion also of the imperfectly digested food becomes acid, acrid, or otherwise hurtful, and either irritates or inflames the mucous coat of the intestines, whilst it passes off with the egesta, or is partly absorbed and carried into the blood, where it becomes the cause of disorder in those organs to which it is more immediately conveyed.

The bottled ale and beer which are taken in the East Indies and other warm climates, are also particularly hurtful to the European constitution, and contribute largely towards promoting the ill effects of those articles of diet now mentioned. From this, however, it is not to be inferred, that bottled ale or beer are in themselves unwholesome, but that they dispose to plethora, and are injurious to the functions of the stomach and liver when taken too largely, or about the same time with soups and various wines. The admixture of the different beverages and articles of diet is very often the chief cause of disorder.

The living of the European soldier in India in many respects resembles that of the better classes of European society, excepting that his breakfast is less substantial, his beverages more spirituous, and his dishes less numerous. The hurtful parts of the diet of Europeans are, however, attainable, and usually adopted by him. He is often exposed to the raw morning air, loaded with the exhalations from the soil, before the sun has rarefied them and rendered them comparatively innocuous, with a scanty or with almost no breakfast, and, upon a nearly empty stomach, receives his allowance of two large glasses of undiluted arrack. The hurtful effects of this upon the system, more particularly upon the stomach and liver, must be apparent to every reflecting mind. Officers will consult their own interests, as well as their better feelings, by attending to this particular diet of the soldier; and by doing so, they will be the means of preserving those under their command both healthy and efficient, and thus acquire their respect and attachment. It would be better for the soldier, in warm climates, were he to have his breakfast as soon after he rises as possible, and that this meal should be, as respects both kind and quality, sufficient till the middle or afternoon of the day. He would then bear exposure to the chief causes of disease, which are generally concentrated and energetic early in the morning, without risk, and be better able to endure the exercise and duties of the day. The hotly-spiced soups and curries which are usually prepared for the dinner of the soldier are generally prejudicial, and relished by him only after he has become accustomed to them. A simpler mode of dressing his meat diet ought therefore to be generally enforced, and his allowance of spirits should be served out to him in a diluted state in the evening, so as to be taken after his dinner, or about night-fall, when the system is liable to be invaded by endemic causes of disease, which then generally accumulate with the falling dews and fogs, and with the stillness of the air, which frequently prevails at this time of the evening.

The diet of the natives varies very considerably. The Mahomedan eats meat daily, when he can procure it. The Pariah and some of the other castes adopt a similar indulgence, to an extent which varies with circumstances; and but few of the Hindoos altogether abstain from animal food of some kind or other. Even with many of the stricter castes, the flesh of the wild deer, the antelope, and of fowls and game of all kinds, are not forbidden: and fish, both fresh and dried, is partaken of by all. But, upon the whole, animal food is sparingly used amongst the natives, with the exception of the Mahomedan and the Pariahs, who partake of animal food when they can procure it, but generally to a much less extent than Europeans. Those of the natives, however, who partly live on animal diet, are stronger and more able to bear up against acute diseases than those who live more exclusively on vegetable food. The diseases of the former somewhat more nearly approach to the type and character of the disorders of Europeans; whilst those of the latter are much less inflammatory, and generally much more fatal, the powers of life sooner sinking under them when they assume an acute form.

This circumstance, which is important in various bearings, has been unjustly viewed as distinctly showing the necessity of recommending the European to adopt a full and liberal diet of animal food; but the indication which may legitimately be derived from it has been carried much too far, and the difference in the original conformation and temperament of Europeans and Hindoos has not been taken into account. The European also, it should be recollected, is fully formed, and his physical and intellectual powers developed, ere he embarks for India; hence food is required only for the repair and support of the system. The use of animal food once in the day, and that in moderate quantity, is all that is requisite to the support of bodily vigour; and whatever is taken beyond this, or even beyond a very moderate quantity at a single meal daily, generates plethora, occasions congestions of the venous system, and induces an oppressed and cachectic state of the body, soon producing acute disease, which speedily exhausts itself, and terminates in fatal collapse.

Having now shown that the diet of Europeans in warm climates generally, and in India in particular, is much too rich, stimulating, and heating, and productive of plethora of the vascular system, and consequently of fever, whenever the exciting causes of fever are in sufficient force to affect the system; and having expressed a conviction that it is calculated, in a most marked manner, to disorder

the functions of the digestive organs, particularly those of the liver, and to lead to organic disease; I shall next offer some remarks upon exercise, as necessary to health in warm countries; and then conclude with some observations on the consequences to which full diet and want of exercise necessarily lead in warm, and indeed in all climates.

Exercise in the open air is one of the most sure means of promoting the health in warm as well as in temperate and cold countries. Europeans residing in the former generally experience a listlessness and indisposition to bodily exertion of every kind, that completely precludes all ideas of any effort, unless when circumstances compel them; hence those who, either from their position in society, the nature of their avocations, or from an uncontrollable indolence, resort not to this means of preserving health, soon become the prey of disease. Exercise in warm climates, even when taken in the coolest time of the morning and evening, necessarily produces copious perspiration, which is not generally pleasant to the sensations of those who have spent the early part of their lives in cold countries. But it is the very copiousness of perspiration which renders exercise salutary, if care be taken not to chill the body subsequently.* The full meals of animal food, and the usual course of diet and regimen adopted by European residenters in warm countries, tend so invariably to create a plethoric condition of the vascular system, and a state of congestion of the liver and spleen especially, that if the former be not diminished by the copious perspirations occasioned by active and frequent exertion, and the latter removed by the accelerated circulation, as well as by the increased determination of the fluids to the surface of the body, produced by the same means, acute or chronic diseases, such as fevers, hepatitis, dysentery, &c., must, sooner or later, supervene upon exposure to their exciting causes. The usual consequence of

* Much mischief frequently arises from the habit too generally adopted by all classes of Europeans of throwing off the coat, neckcloth, or stock, and thus lounging on a couch or sofa, exposed to currents of air, upon returning home overheated and perspiring from riding or walking. The use of the punkah, or large fan, for the purpose of cooling the body when perspiring from exercise and deprived of the outer habiliments, is equally hurtful. When exposed, under such circumstances, to currents of cool air, the evaporation from the body is accelerated, coldness of its surface rapidly produced, and the circulation suddenly thrown back upon a weakened, predisposed, and sometimes an already diseased organ. The imprudence now noticed, for the purpose of remedying it, is a most frequent cause of sickness amongst young European recruits on their arrival in India.

overfeeding, in all animals, as well as in man, combined with indolence and want of exertion, is enlargement of the great glandular organs of the abdomen, particularly the liver; and this consequence is the more marked, and the sooner induced, the warmer the temperature in which the animal exists, and the more complete the inaction to which he is doomed.

But a regular and sufficient exercise,—so as to promote a full and copious perspiration and regular circulation in the cutaneous surface,—is not only serviceable in overcoming plethora, and unloading the vascular system of a part of those fluids which are continually being conveyed into it through the medium of the absorbing vessels, and in removing the congestions and determinations of the circulating mass upon the large abdominal viscera; but it most unequivocally and powerfully promotes the healthy functions of those organs which are engaged in the elaboration of the most important secretions of the body, and in the elimination of those materials from the blood which have served their purposes in the economy, and whose removal from it is requisite to its healthy condition. The secretion of bile, the removal of congestions of this fluid in the biliary ducts, as well as in the gall-bladder, the secretion and discharge of urine, and the cutaneous secretions, are all promoted by a regular and sufficient exercise.

But in order that exercise may be beneficial, it must be regular, and continued without intermissions of indolence—it must be daily, and in warm climates it should be taken in the cool of the morning and evening; thus leaving the intermediate hot part of the day to reading, study, conversation, or whatever occupations may not over-fatigue or over-excite the system. By this, however, it is not meant to inculcate that no exercise should be taken in the middle of the day, or that lighter occupations and amusements may not then be entered upon; but that these should be pursued much more rarely, and with greater precautions as to temperature and exposure to the sun, than in the early and latter parts of the day. Other precautions as to exercise are also necessary, even when resorted to at periods apparently the best suited to the purpose. It should not be too violent in its nature or tendency, so as to fatigue and exhaust the system; but it ought to be sufficient for the purposes already indicated, and should, in a warm climate, be followed by a genial and copious perspiration, which ought not to be checked by exposure to cold or currents of air, or by a sudden discontinuance of the exercise which occasioned it. During the period of taking exercise, those causes and places which have been shown to

be productive of terrestrial exhalations should be avoided; but if the exercise be properly suited to the season and time of the day in which it is taken, they need not in any measure be dreaded.

With respect to the kind of exercise that is to be preferred, this must depend upon circumstances. Riding in carriages can scarcely be considered as sufficient for the wants of the system, unless in the cases of weak, sickly, or convalescent persons. Horseback and walking exercise are preferable, and both should be resorted to. Cricket and fives are useful and amusing means of exercise in the cooler periods of the day, and billiards answer the purpose well when the temperature precludes any more active means. Above all, indolence should be avoided, whether of mind or body; it enervates the whole frame, becomes more inveterate from indulgence, and exposes the system to the invasion of all the causes of intertropical diseases. An inactive mode of life also leads the mind to indulgences which are hurtful to its own energies, as well as baneful to the physical condition of the body. When the mind is unemployed or unexcited by those avocations and undertakings, which, while they interest the mind itself, impart energy to the frame, the follies and dissipations of life are more freely indulged in, the causes of disease more readily impress the system, both from without and from within, and hence the indolent and inactive become soonest the prey of disease, and are its most ready and numerous victims. That person will enjoy his health the best of any, in warm climates, who occupies his mind with interesting and important pursuits,—who takes a regular, a judicious, and a sufficient exercise,—who lives in moderation and without undue indulgences, and adopts in every respect what I have recommended in a former section of this work.*

Of all the various animal wants and indulgences, eating and drinking are those most liable to irregularity, from their being so much under the control of the will, from the gratification they afford to the senses, and from the frequent return of the desire, as well as the necessity, of complying with the intimation they convey at comparatively but short intervals. The wise provision, however, manifested in our organization, and the wide range permitted to man in the choice of his food, are such as both to allow of great diversity in his selection, and to diminish the danger of an injudicious adoption. Yet the wise limits imposed by nature cannot be frequently passed without danger. Such imprudence frequently,

* See page 53.

indeed, punishes itself. But the repetition of excesses, or the adoption of a too great quantity, variety, or improper quality, of food and drink, is always productive of effects most injurious to the functions, and even to the organization, of those organs whose office it is to dispose of the ingesta, and to change them into healthy materials for the repair and support of the frame. If we look closely into the commencement and early progress of many of the disorders of warm climates, we shall have no difficulty in tracing how errors committed in this way influence the functions of the abdominal viscera, and derange the whole system. While occasional excesses, or deviations from the strict rules of temperance, are productive of increased action, which soon subsides if the cause be not renewed,—and while several of the consequences of such excesses remedy themselves without the assistance of art, when the functions and organization of the internal viscera are sound or not materially impaired,—yet the frequent repetition of such excitements exhausts the energies of the constitution, until they are no longer able to preserve it from suffering from the slighter causes of disease, which, in their unimpaired condition, they would have successfully withstood.

The influence of diet and regimen upon the health of Europeans in warm climates, is very forcibly shown in the varying characters or kinds of disease to which they are subject, according as the modes of living differ. European soldiers live much less fully, as respects eating, than their superiors; but they drink more spirituous liquors, and indulge in the intoxicating drinks of the country. They are also exposed more to the climate and its vicissitudes, and to the exhalations proceeding from the soil. The results of all these upon their constitutions are, a greater liability to fevers, dysentery, and the more acute form of hepatitis. On the other hand, the better classes of society, who indulge more in the gratifications of the table, who drink more wholesome beverages and in much greater moderation, and who are less exposed to the vicissitudes of the climate and to marsh exhalations, are less subject to fevers and dysentery, but more liable to stomach complaints, and to the functional and chronic disorders of the liver.

The observations now offered respecting the manner of living in warm climates generally, are, in a great measure, applicable to society in several countries in Europe; and a great proportion of the diseases which are met with in the middling and better classes of persons in these countries, derive their origin from the full living and the heating and nutritious dishes indulged in. In warm

climates, however, the hurtful effects of this sort of diet are heightened by the greater elevation of temperature, by the abundance of terrestrial exhalations floating in the atmosphere, and by the circumstance, that Europeans residing in warm countries seldom enjoy exercise to the extent to which they require it, and by the general indisposition on their parts to take it, even when they have it in their power. The succession, also, of seasons, varying so much as respects temperature in cold and temperate countries, while it tends to produce in these quarters various diseases, not materially prevalent in India or in warm climates, has a considerable influence in diminishing the evils resulting from full living, and in invigorating the system generally. Within the tropics, the bracing effects of a cool dry air are seldom felt; and the continued operation of a high temperature and a moist air loaded with miasmata, most materially impairs the powers of life, diminishes and otherwise deranges the secreting viscera, and renders over-feeding, and all other kinds of intemperance, productive of plethora, and the diseases resulting therefrom, as well as those maladies which spring directly from a morbid state of the secretions concerned in the functions of digestion and chylification.

CHAPTER II.

ON THE EARLY OR PREMONITORY SYMPTOMS OF INTERTROPICAL DISEASES.

It will be admitted by all practitioners, that disease is generally far advanced before application is made for relief. In civil life this is a circumstance which the physician cannot control, however he may regret it; but it is somewhat different with the regimental surgeon. He is constantly with his men; and if his attention be directed to the well-being of those under his charge, he may often observe, even in the change of countenance, the approach of disease. By carefully and watchfully discharging his duty, in warm climates more particularly, and by detecting the accession of disorder, he acquires a great advantage over the practitioner in civil life,—an advantage which he may turn to account, either in checking disease at its outset, by the treatment which he may then adopt, or in diminishing its severity and danger through its advanced stages, when it cannot be arrested. That these advantages are attainable by those who are anxious for the health and efficiency of the individuals committed to their charge, was very forcibly impressed upon me during the expedition to Java, when in charge of His Majesty's 78th regiment. On all occasions of actual service within the tropics, the efficiency of every man is of the utmost importance; and with that feeling, my attention was particularly drawn to the men under my charge; not only to give assistance when called upon, but to endeavour to prevent disease. In order to gain this desirable end, I made it a point, during the passage to Java, from April to August 1811, at the daily parade of each company, and often when the men were off duty, to examine the expression of their countenances; and whenever I observed any sign that marked the slightest degree of disorder, I immediately instituted farther inquiry, and resorted to means suited to the information obtained. The good effects of this attention were manifested on the disembarkment of the troops at Java. Not more than seven were left sick out of about 500 men in the head-quarter

ship, and which were under my more immediate charge; and not more than thirty or forty out of the whole regiment of 1070 men: thus proving that the diseases of warm climates may be often prevented, or checked, or mitigated, by early measures of a decided and appropriate nature.

The premonitory symptoms of disease are frequently so very slight as to pass unnoticed by the patient himself, and are often considered of no moment by the physician. This may be partly attributed to the indifference with which many treat what is called slight bilious feelings, and from the expectation, that the uneasy sensations which are felt arise from a temporary disturbance of the functions of some one of the digestive organs, which will soon bring about its own cure, without the trouble of application for medical advice, or the disagreeable necessity of resorting to medicine. But the subject is too important to be so lightly viewed, and is, moreover, of so great moment to the public services of the country, that the attention of both the physician and the community should be properly directed to it as a means of preventing and checking disease, and thus of preserving soldiers and sailors in warm climates more competent to the discharge of their duties.

It is evident to every one who has observed the early progress of disease, that, before those sensations and symptoms are experienced which are more generally regarded as denoting its actual existence, a period elapses during which disorder is forming and advancing to that pitch which at last convinces the patient himself, and the medical man to whom he then applies, that disease has assumed a specific and an important character. In the very numerous instances of fever which are hourly occurring to the intertropical practitioner, patients seldom or ever apply to him; nor does he scarcely ever meet with a case of the disease, before the stage of rigor is fully formed; and most frequently not until the stage of reaction or excitement is developed. And yet, every medical man who has looked closely into the phenomena which disease presents, from the first impression of its exciting causes, until it fully explodes itself upon the frame, knows that days of disorder exist, marked by symptoms, which, however perceptible and perfectly cognizable to the experienced and closely observing physician, are yet treated as immaterial by the patient himself, or at least looked upon as that sort of slight stomach or biliary disorder which quietude and moderate diet will remove, without further assistance.

In fuller illustration of this subject, I may refer to a very frequent occurrence, and one that will be recognised, not only by those

in India, but by those who have ever been there—snipe shooting and hunting parties. These are generally arranged late in the evening, after dinner, and are entered upon early in the morning. It is impossible, therefore, that the individuals engaged in them can have the repose necessary to recruit the system from the exertions of the preceding day. After riding eight or ten miles, they commence snipe shooting in the marshes and rice fields, where they are up to their knees in water; and thus, in a state of fatigue, they are at once brought within the influence of those marshy exhalations which are the most frequent exciting cause of fever in warm climates. The exposure to this cause taking place during a period of predisposition to its invasion, and at a time of the day when the cause itself is in considerable concentration, that impression is made upon the system which is productive of fever, and its future subject returns from his excursion with the seeds of it sown in his frame. For a day or two he complains of little or nothing excepting a weight in his back, loins, and limbs, some loss of appetite, and a disinclination to exercise or employment of any kind. To these he attaches no importance, imputes them to fatigue from his excursion, and he does not resort to any means for removing them. They, however, continue, and even increase; and in a short time a slight headach, with confusion of ideas, comes on, especially towards evening, and is attended with disturbed repose and unpleasant dreams. His appetite now becomes further diminished, his countenance is pale, sallow, and a somewhat darker tinge is remarked beneath his eyes, which are at the same time muddy, and deficient of their usual expression and liveliness. These symptoms continue for several days: they are insufficient to confine him, or even to excite ideas of his being actually ill; but he feels out of health, and every kind of occupation is a burden to him. At last, after a period widely varying in its duration, generally enduring from two or three days to a fortnight,—during which time these symptoms continue gradually to increase,—nausea often supervenes, the bowels become irregular, the tongue white and loaded, the countenance sunk and muddy, the surface cold, dry, and harsh; and at last, irregular chills, formication, and even complete rigors, supervene, with sinking and a sense of anxiety at the pit of the stomach and præcordia, and increase of the pain in the head, loins, and limbs. This is that precise stage of the disease at which the patient generally becomes alarmed, and when he first finds himself unable to pursue his usual occupations. It is then the medical man is called upon for the first time, when disease is fully established, and

perhaps it is too late to be arrested: still much may be done to mitigate its violence. The physician being fully aware of the nature and cause of the disease he is called upon to heal, may be enabled to employ those means which are likely to check that train of morbid phenomena going forward in the system, and thus, perhaps, to restore health. What these means are will be seen when I come to treat of fevers in particular.

Patients themselves, in warm countries, especially those in the better ranks of life, being made acquainted with those sensations and signs which indicate the commencement and early progress of disease, and being informed of the effects which more immediately, although less perceptibly, proceed from its exciting causes, will be induced to make a more early application for medical aid; and when such aid is not within their immediate reach, will be enabled to resort to such simple and safe means as are in the power of nearly all, but which ought, however, only to be resorted to until more experienced and efficient assistance can be procured. The necessity, in short, of paying an immediate and efficient attention to the premonitory symptoms of disease, ought to be impressed upon the mind of the young and inexperienced medical officer, and, whenever it can be done with propriety, upon the minds of persons generally who are resident in warm climates, because disease runs its course in these climates so rapidly, that the loss of an hour is of great importance.

Besides those diseases which proceed more directly from external impressions, there are others which result from internal sources. The former are, upon the whole, the more frequent in warm climates; but they do not always depend upon external causes alone, the internal changes taking place in the system, in consequence of ill-regulated diet and regimen, being the predisposing causes favouring their operation. What the chief of those errors of diet and regimen are, which prove the fruitful source of many diseases, and the predisposing causes of many more, has been already shown; but there still remain various points connected with the subject requiring to be touched upon, and which, in a stricter sense, should be viewed as the first changes constituting disease, rather than its causes, although, like all other derangements to which the living frame is liable, all functional or even organic changes become causes of subsequent disease.

I have already mentioned the consequences of full living, particularly on animal food, conjoined with indolence; and have shown that plethora is a necessary consequence of the indulgence. Full

living on animal food is frequently attended, in many temperaments, with a constipated or otherwise irregular state of the bowels, and a costive and offensive state of the stools; and this is more remarkable in those who take little or no exercise, and even in those who enjoy sea air, or change of air, without much personal exertion. The consequences of full diet, combined with deficient exercise, and a constipated state of the bowels, must be apparent to every one who reflects upon the laws of the animal economy. Although in many instances this state of existence can scarcely be viewed as constituting disorder, yet in others it is evidently so, and in every case it must at least be viewed as leading to it. Constipated states of the bowels, in persons living much upon animal food and rich dishes, tend very rapidly to produce not only plethora of the vascular system, but also to vitiate the constitution of the blood itself; for constipation is very generally an effect of an inadequate state of function of the great secreting viscera, and of the mucous surface of the digestive canal. Indeed, the biliary and other secretions which are poured into the intestines are actually formed, in a great part, from the materials which require to be removed from the circulation, and upon whose removal the purity of the blood in a great measure depends; and while the due and abundant formation of these secretions thus tends to the purification of the circulating mass, and to the diminution of its quantity, the requisite regularity of the excretory functions is thereby promoted.

But it is not only a constipated state of the bowels which is to be observed as characterising the commencement of disease, and hastening its progress,—a too relaxed or otherwise disordered condition are likewise present on several occasions. The bowels may be remarkably costive, and afterwards relaxed; and, attending the relaxed state, much tenesmus and scalding, both during the time of passing a motion and afterwards, may be present. When such is the case, active purgation is then indicated, as the best means of preventing further disorder; and this indication is the more urgent if the stools are obviously deficient of bile, or if they afford proofs of an unhealthy condition of this fluid, and of the intestinal secretions generally. These are circumstances which will be more fully insisted upon in another place; but the attention of both patient and practitioner ought to be drawn to them as important premonitory signs of disease. It should also be remarked, that, although the evacuations appear natural and healthy in colour, the alvine secretions and functions are not on that account to be considered as free from disorder, especially if there be present any symptoms indicat-

ing the contrary: for it will be often observed, that after the repeated exhibition of purges, the stools, which were at first healthy, change their character, and at last indicate that the morbid secretions and accumulations are at last let loose, and are in process of being brought away: even the exhibition of a single brisk cathartic will often show, in cases where it has been much wanted, the first and second stools natural, and the third, fourth, fifth, and sixth, more and more disordered and offensive; and this sequence of appearances will often continue to present itself for several successive days, when purgation is daily prescribed, until the alvine evacuations, on the removal of all disorder of the abdominal organs, at last will acquire a healthy appearance. There are extremely few diseases in which the functions of the bowels are not more or less deranged at their commencement, and in which, even when the stools are regularly voided, they are not slimy, viscid, tenacious, dark coloured, and variously offensive. And it should be always kept in recollection, that the functions of the chylopoietic viscera and intestines are not necessarily regular because the bowels are daily evacuated. The motions themselves ought to be examined, and opinions drawn from the appearances they exhibit. Indeed, I consider as corollaries from the foregoing, and as pathological facts of the utmost moment in the investigation of the early conditions and changes in the system leading to, or constituting disease, that much animal food, the use of malt liquors, and insufficient exercise, are most eminently productive of plethora;—that plethora, if its causes be persisted in, will occasionally remove itself, but not without being productive of actions constituting disease, such as diarrhœa, dysentery, or fever;—that, when constipation is superadded to full living and insufficient exercise, then it may be also inferred, that the resulting state of plethora will be further increased by the diminished functions of secretion and excretion, constituting costiveness;—and that, as secretion and excretion are in a great measure the discharge of hurtful or superabundant materials from the blood, this fluid will be, under such circumstances, deranged in quality, at the same time that its quantity is much too great. Even when the functions of secretion are going forwards in the abdominal viscera, if excretion be not at the same time regularly and adequately, as respects the quantity of ingesta, performed, a great part of the secretions will be reconveyed into the circulation, with a portion of excrementitious and hurtful matter, where the whole will be a source of further disorder, until the functions of some emunctory at last remove them.

This condition of the vascular system, and of the secreting and intestinal functions, is often combined with a foul and diseased state of the cutaneous surface: and there is perhaps nothing which more completely proves the co-existence of full and gross feeding, with many of its consequences—namely, plethora, diminished or morbid secretion, and a constipated or an irregular state of the alvine evacuations—than the presence of some one of the numerous family of cutaneous eruptions. The co-existence of external eruption with plethora and imperfect secretion and excretion, is often indeed a fortunate circumstance for the patient, inasmuch as the external disorder may, with the greatest propriety, be looked upon as one of the chief means of preventing the particular state of the vascular and secreting organs now insisted upon, from being productive of disease in some internal and vital organ. How often, indeed, do we find, that those who take narrow views of the origin of external diseases, and by local means endeavour to shut up this outlet of disease, which nature opens upon the surface, for the preservation of the individual, in spite of his own imprudencies, are productive of mischief, and thereby endanger the life of the patient when they accomplish their object, by causing the consequences of the states of the system now described to fall upon an internal viscus? In the majority of cases, the most rational and successful treatment does not depend upon external means; or if in any degree they are benefited by them, it is only in a subsidiary manner. The most safe, and at the same time the most efficient mode of cure is, to deplete generally or locally, according to circumstances: to act decidedly and sufficiently upon the great secreting viscera and upon the intestinal secretions and excretions; to promote the cutaneous functions by warm bathing, vapour baths, and every other means usually resorted to for that purpose; and to put the patient upon light and spare diet, with sufficient exercise.

The debility which often accompanies a plethoric state of the system has been a frequent cause of serious and mischievous mistakes on the part both of patient and practitioner. It is generally the necessary result of an engorged or congested state of the vessels, particularly of the veins, and is almost always so combined in the first days of disorder following the impression of the exciting causes of intertropical diseases. It should be looked upon as the earliest symptom of commencing disease; but its cause ought also then to be well understood. There is, doubtless, at the time a depression of the vital and nervous energies; but they are merely kept down by the vascular load which presses upon them, and will

spring up again as soon as that load is removed. The heart and the blood-vessels, particularly those of the secreting viscera, are engorged beyond their impelling powers, and the sinuses and veins of the brain and lungs are in a similar state,—thus pressing upon the great nervous centre, and thereby diminishing nervous energy, and interrupting those necessary changes which the blood undergoes in the lungs, and which, if not performed fully and healthily, become the source of further disorder, inasmuch as the circulation of imperfectly purified blood throughout the body and in the brain lessens the activity of the nervous influence and the powers of the system. Debility, moreover, co-existing with plethora, and depending upon it, tends also in a most eminent manner to diminish secretion and excretion, and thus to prolong, and even to increase, the plethoric condition from which the debility arises. The lowered energy of the frame is here merely a necessary sign of the plethoric state, although it also assists in continuing and augmenting this state Much mischief has consequently arisen from the circumstance of debility being viewed as the only evil, with the removal of which all disorder would cease; and many, acting upon this view, have given tonics and stimulants, have increased the appetites thereby, and thus augmented the original evil, viz. plethora and congestion, until the state of simple fulness of the vascular system, either locally or generally, and the resulting debility, have been converted into inflammation of some important organ, or an attack of fever. How very different would the case have been, had active and repeated purgatives been given with gentle stimulants and sudorifics in the intervals; and the requisite depletions, either generally or locally, according to circumstances, with a properly regulated diet and regimen, been instituted. It is true that in many cases of debility, resulting from vascular fulness, and constituting the early stage of intertropical diseases, the powers of the nervous system require to be roused at the same time that the fulness must be removed; but the means of accomplishing the former must be gentle, and the least calculated to convert congestion into inflammation,—a termination to which congestion is extremely prone in warm climates. The debility, therefore, which accompanies a loaded state of the vessels, and characterises the early stages of disease, is not curable by tonics and astringents, but by evacuants and by those medicines which increase secretion and excretion, which establish a regular and active state of the alvine functions, and which increase cutaneous transpiration; and by a regulated diet and due exercise.

Besides the foregoing conditions, characterising incipient disease, and tending to hasten its progress and aggravate its nature, there are others which require remark. The liver, is perhaps, that organ which feels most the effects of full living, deficient exercise, and the consequent plethora of the vascular system, and which evinces the earliest derangement. Attention should therefore be always directed to this viscus, both by the patient himself, and also by his physician; and a careful watch should be kept over the functions and condition of the organ, by observing the frequency and appearance of the stools, the sensations experienced in the region of the viscus at the pit of the stomach and about the right shoulder. The expression and colour of the eye, and appearance of the countenance and skin, should also be observed; and as soon as any circumstances or sensations indicating disorder make their appearance, judicious means should be resorted to, to avert the consequences which neglect would allow infallibly to supervene. Congestions in the substance of the liver, consisting either of blood in the vena portæ or in the hepatic vein, or of bile in the biliary ducts or gall-bladder, are amongst the earliest consequences of full living on animal food, in warm climates, and insufficient exercise,—are those states of this organ most frequently supervening during the few days which first elapse after the impression of the exciting causes of disease upon the system,—are always attended with an imperfect and disordered state of this secretion,—and almost necessarily are followed, if not judiciously treated, by acute, sub-acute, or chronic inflammations, by bilious diarrhœa or dysentery, or by bilious remittent and continued fevers, as the nature of the predisposition of the individual, or the exciting or co-operating causes, may determine. The bad effects of resorting to stimulants or tonics, in this condition of the biliary apparatus, must be apparent; and the ill consequences now enumerated are more readily brought about by such means. On the other hand, those remedies which unload the liver, either by moderately withdrawing blood, or by eliciting secretion, and by promoting the discharge of such secretions as oppress the parts in which they have accumulated, or by occasioning a flow of the circulation to the surface of the body, are the measures which will, together with spare or moderate diet and due exercise, most certainly restore the healthy functions of the organ, and arrest the impending disorder. What the particular means are, which should be adopted in order to fulfil these intentions, will be stated at length in the sequel. It sometimes, however, happens, owing to peculiar states of the organ threatened with

disease, that the best means which can be used, in order to unload the vascular system when it is greatly oppressed, are followed by increased action, to an extent which threatens the worst consequences: but this cannot be prevented by the adoption of any other measures better calculated to prevent it, than a steady perseverance in their employment, directing them, combining them, and varying them, according to the particular circumstances in which we are called upon to employ them. Reaction will sometimes arise in the system generally, and in that organ particularly which has been more immediately oppressed, soon after the load has been removed. But such reaction will be less detrimental when it supervenes upon the judicious plan of diminishing vascular fulness, and increasing the whole circle of the secretions and excretions, than when induced by the imprudent exhibition of heating stimulants and tonics. The former will merely bring about a salutary reaction, which, if not guarded against, may indeed lead to inflammation of the predisposed organ; the latter plan will more certainly induce inflammatory action, which will be less readily controlled, and will more rapidly run into abscess, and thus actually occasion what in the former instance we have only to guard against, or at most to dread.

The state of the tongue is one of the most sure criteria by which our judgment is guided respecting the condition of the abdominal viscera and the commencement of disease. When it is foul or loaded, it may then be inferred that the alvine secretions and evacuations are not adequate to the wants of the system, and that they require to be increased, in order to avert impending disorder. It is not sufficient that the tongue shall appear clean over its more anterior surface, but that it shall also be so at its base. It very frequently will be observed, at the commencement of febrile and inflammatory complaints, that, in addition to a foul state of the tongue, the fauces are red and fiery, and the uvula relaxed. These appearances are not only indicative of threatened disorder, but also require the employment of alvine evacuation. In conjunction with the foregoing states, the papillæ on the surface of the tongue are often early in disorder, large, prominent, and excited, and the surface white. This particular condition is frequently connected with a plethoric state of the vascular system and general excitement, and, in the majority of instances, indicates the propriety of general and local evacuations. Not unfrequently the tongue is dark-coloured and of a brown appearance. This is usual at the commencement, and indeed through the progress, of diseases where

great prostration of the energies of the system exists, and which are characterised by congestions, particularly in the liver, brain, and lungs, and by a previously neglected state of the alvine functions. Early in disease, also, the tongue is often covered with a slimy mucous coating, which is generally indicative of a foul and loaded state of the mucous surfaces throughout the intestinal canal. This appearance most obviously requires the institution of active purgation, which in many cases should be preceded by the exhibition of an emetic, particularly in cases of approaching fever, and before the febrile excitement is fully formed. There are other states of the tongue and fauces which require attention, as indicating the commencement and progress of disease,—such as, dryness of the tongue and pharynx, redness of these parts, particularly the edges of the tongue: but these mark more frequently the advancement of disorder, and will be noticed more appropriately hereafter.

The state of the pulse, as indicating the heart's action, and the general condition of the vascular system, is deserving of the most intimate attention, in the early stages of disease, as one of the best means of ascertaining the existence of plethora, of congestion, and of several of the consequences to which they lead. When the pulse is slower than natural, our attention is at once directed to the state of the functions more immediately dependent upon the brain. But although the pulse is often slow for the first few days after the causes of fever have operated upon the system, and before the febrile symptons are developed, yet the slowness in such cases seldom is the result of oppression of the brain, but rather of deficient energy of the nervous and vascular systems. At the same time that the pulse is slow during the premonitory stage of fever and inflammatory diseases, it is also then often irregular, and even intermittent, and such is more frequently the case when the commencement of the disease is attended with congestion or impeded circulation in the vessels of the liver. An irregular and intermittent state of the pulse is often met with in individuals who make little or no complaint, and whose only disorder is a plethoric condition of the vascular system and slight signs of derangement about the biliary organs. When this state of the pulse is thus noticed, such curative means should be resorted to as are calculated to meet the exigencies of the case. Generally the pulse, at the same time that it is irregular and intermittent, and particularly when the intermissions are only occasional, and not depending upon organic disorder about the valves of the heart, is also obviously oppressed. This latter state of the pulse should, perhaps, more than any other,

put the practitioner upon his guard: for it is very frequently present during the premonitory stage of those diseases which are most prevalent in warm climates; and it, more certainly than any other sign connected with the pulse, indicates inordinate fulness of the vascular system, and that state of congestion about the great vessels and in the great secreting viscera most prone to become productive of fever or inflammation.

The pulse, if carelessly examined, may often mislead; and it requires great nicety of tact, and much experience, to discriminate between the various states of the system which the pulse indicates, and the progressive advance of disease. The irregularity of the pulse, already noticed as indicating the commencement of disorder, relates to both its strength and frequency. When the artery makes a few strong pulsations, as if by an effort, and then relaxes into a state of diminished and oppressed action, a congested state of the internal viscera is denoted, and the state of the liver should be inquired into. In this state there is reason to believe that disease is commencing in the liver, and that the constitution is, as it were, making efforts to remove the oppressed state of the organ, which will soon be productive of reaction, and even of inflammation of it, if means are not soon resorted to in order to prevent such consequences. Preternatural slowness, with fulness of the pulse, giving the impression of difficulty in the propulsion of the stream of blood, is always indicative of too great fulness of the vascular system; is generally the sign of incipient disease, particularly of fevers, of congestion of the vessels of the head and liver; and is a sure guide to the treatment which should be adopted.

Not the least important of all the symptoms which ought to be viewed as premonitory of intertropical diseases, are, the states of the surface of the body, and the appearance of the countenance. As respects the latter, it may be said generally, that whenever its colour, or its expression, in any way differs from its natural character, that disorder should be suspected; and that the severity and danger of the disorder may be learned, to a great extent, from the manner and degree in which the features and their expression are changed. When the countenance is collapsed, sallow, and languid, then the powers of the system may be viewed as being deficient. This state of countenance is often present during the premonitory period of febrile and inflammatory diseases, and in affections of the biliary organs; and is frequently accompanied with a muddy or dark state of the skin of the face, and deficient expression and liveliness of the eye. The opposite state of the features, viz. unusual

fulness, flushing of the face, and a prominent state of the eyes, with injection of the conjunctiva, indicate excitement of the vascular system, and the fully developed stage of fever, or of inflammatory action.

With respect to the state of the cutaneous surface, it may be said generally, that a dry, unperspirable, and harsh condition of it, usually ushers in the majority of diseases, and should always indicate the propriety of resorting to active measures, in order to prevent the impending consequences, and to re-establish the perspiratory function. With this state of the surface is often connected unusual coldness; and this is sometimes remarkable during the few days of partial ailment which elapse more immediately upon the first impression of those causes of disease which proceed from the soil and season. This lowness of the animal heat, taken in conjunction with the other concomitant phenomena, serves, most unequivocally, to point out the particular state of the constitution which these causes produce, and the means best suited for its removal. In many cases, and particularly when the period of the full development of the disease approaches, the skin, although dry, harsh, and unperspirable, is as hot, and even hotter, than natural. And even when the temperature is above its usual standard, the patient is often chilly and uncomfortable in his sensations. These feelings generally pass off as the febrile symptoms develope themselves; but when they are present, they indicate approaching disease, which may be arrested by active means, employed appropriately to the circumstances of individual cases, and with due promptness and perseverance on the part of the physician. When, in addition to a cold, harsh, and collapsed state, the surface of the body is covered by a damp, raw, and cold moisture, which is usually the case even at the commencement of the epidemic cholera, the threatened danger is then more urgent, and the means which are then requisite must be more energetic.

To ascertain the approach of disease, and to investigate its nature during its early periods, are objects which are most deserving the attention of the intertropical practitioner, as endowing him, to a great extent, with the power of arresting its progress, by the employment of suitable and energetic means; and, when that cannot be effected, of averting many of its worst or most dangerous consequences. Indeed, to arrest diseases at their first outset, and thus to prevent not only great consequent suffering, but also, in many cases, fatal results, must be viewed as the most valuable application of medical science.

The observations now made upon the propriety of attention to the premonitory stage of disease, and the suggestions offered in order to enable the inexperienced practitioner to detect it in its various forms, are the results of my own observations and experience. I do not bring them before the public as complete in all their bearings, and as amounting to what may altogether be desired upon the subject; but I venture to state them with confidence, being founded in truth and in nature; and offer them to the practitioner as a sketch which his own observation may fill up, and as materials which may awaken in his mind many important suggestions tending to the further elucidation of the subject.

BOOK II.

ON THOSE DISEASES OF THE STOMACH MOST PREVALENT IN INDIA AND WARM CLIMATES.

Disorders of the stomach are seldom met with in warm countries in a pure and uncomplicated form; and when existing as primary disorders, are often not much attended to on the part of the patient until they become connected with, or give rise to, more serious disease,—most frequently of the liver and intestines. Disorders of the stomach are not, however, rare; but they are so generally associated with very important and often dangerous diseases of the adjoining viscera, as to be in a great measure concealed by the urgency of the symptoms of those with which they are complicated; and when they obtain the attention of the medical practitioner, they are often viewed as merely symptomatic of those diseases. As, however, they sometimes stand forth the prominent disorders, and as they frequently lead, by neglect in their early stages, to those diseases which afterwards mask their existence, and which justly receive the chief attention of both patient and physician, as being the most urgent, I shall venture to make a few observations respecting them, the result of long experience in warm climates.

CHAPTER I.

ON THE FUNCTIONAL OR PRIMARY DISORDERS OF THE STOMACH, MOST FREQUENTLY OCCURRING IN WARM COUNTRIES.

THE functional and primary disorders of the stomach are frequently not much attended to by Europeans residing in intertropical countries, being generally viewed by them as the necessary consequences of the climate, and thus allowed to make progress until they produce effects which awaken the apprehension of the patient. This is the great evil to be dreaded from neglecting slight ailments; and such neglect is productive of much mischief in temperate as well as in hot countries. In the latter, however, it is the more deserving of attention and remedy, inasmuch as the consequences attendant upon negligence are here more rapid in their progress, and more injurious to the frame, than in the former.

SECT. I.—*On the Causes, Symptoms, and Nature of some of the more frequent Forms of Indigestion within the Tropics.*

The earliest symptoms which present themselves when the functions of the stomach are incompletely performed are, a feeling of oppression and distension, with flatulence and acid eructations after a full meal. These often continue to be present for months, or even years, in temperate climates, without being followed by any more serious disturbance of the system. In warm climates, however, this is less frequently the case, some more serious disorder generally soon supervening, as will presently be seen. At first, the above-mentioned uneasy sensations are generally got rid of by the patient taking less bulky meals, or more digestible food; for he soon learns to impute his uneasiness to the right cause. But if his appetite happen to be good, at the same time that the digestive powers are impaired,—a very frequent coincidence both within and without the tropics,—it very generally is observed, that he is thereby induced to eat a greater quantity than the stomach will digest, and hence disorder is likely to be produced. Indulgence

in food, beyond the wants of the system and the powers of the stomach, is not only promoted by the state of the appetite, but it is also encouraged by the arts of cookery, and by the stimulus imparted by various wines partaken of during the time of eating. Alimentary matter being thus taken in too great quantity in relation to the digestive energy, the secretion of the gastric juice, and the tonic actions of the stomach itself, are inadequate to the production of the healthy changes which the food should undergo before it passes the pylorus into the duodenum; and hence one of two things must supervene,—either the change of the whole is imperfect, or a part only of the food is converted to healthy chyme, and the rest remains altogether undigested, and ready to undergo those combinations which the chemical affinity of their elements dispose them to enter into when subjected, in a moist or fluid form, to the temperature of the frame. If the former alternative supervene, then an imperfect chyme is formed, which is unfit for the changes which it has to experience in the duodenum and small intestines, when subjected to the operation of the secretions poured into these parts of the intestinal canal; and, consequently, it undergoes those combinations imperfectly and with difficulty, disordering the viscera concerned in the process, and giving rise to an incompletely formed chyle. If the latter alternative take place, that part of the ingesta which is altogether unchanged into healthy chyme, by forming those combinations which the chemical affinities of its elements dispose it to enter into, irritates the internal surface of the stomach, and gives rise to many of those symptoms which constitute the prominent characters of disorder, such as flatulence, acid and rancid eructations, pain and distension of the stomach, cardialgia or heartburn, nausea, vomiting, &c. Such are the more immediate consequences as regards the stomach, when food is taken in too great a quantity for its digestive powers; and these effects continue, or even increase, in proportion as the habit is persevered in. But there frequently arise, even early in the disorder, various morbid phenomena, manifesting themselves in parts remote from its seat. Amongst these, the most deserving of notice are such as supervene in the alimentary canal, and affect its functions. That deranged function of the intestines, and indeed of the adjoining viscera, should accompany, or supervene to, disorder of the stomach, is only what may be expected from the organic connexions of the parts, and the manner in which the healthy action of one organ is dependent upon the due performance of the functions of adjoining parts. Thus, we have generally accompanying the

early progress of indigestion, as marked by the symptoms already mentioned, a costive state of the bowels. Indeed, the diminished action of the stomach constituting dyspepsia is seldom confined to this part of the alimentary canal, but extends itself more or less to the whole tube, and to the viscera allied to it in connexion and function. Hence it is that costiveness and a torpid state of the actions of the liver so generally accompany the early periods of the disorder, and, when allowed to continue, increase the original evil.

Diminished function of a secreting organ or surface is generally followed by a viscid, inspissated, or otherwise disordered state of the secretion itself; and hence we find, in cases of indigestion, that the mouth and tongue are foul and clammy, and the latter covered with a whitish or yellowish fur. The intestinal secretions are also not only diminished in quantity, but they also seem, conformably to the general law now alluded to, very materially changed from their healthy character: they become viscid, tenacious, and, owing to the diminished actions of the mucous surface, they accumulate upon and adhere to it, so as to be with difficulty removed, obstructing those actions which are performed in the internal surface of the canal. Even the repeated operation of purgatives fails in removing the accumulated secretions; and it is not until these remedies have been exhibited for a series of days, that the stools assume a healthy appearance.

When the dyspeptic symptoms have continued some time, the bowels become disordered in a still more marked manner. They are generally at first costive; but this state is often followed by the discharge of some offensive and irritating stools of a lax nature, when they again return to their previous condition. This irregularity arises generally from two sources: first, from the acid and irritating matters formed in the digestive canal, from the imperfectly concocted food; and, secondly, from the secretions thrown out upon the mucous surface having undergone some change rendering them more irritating to the adjoining parts, and thus bringing about their discharge. When these conditions of the intestinal secretions and contents are present, the stools are generally extremely irregular, being alternately for many days costive, and for others much relaxed. The stools are also, whether voided voluntarily, or procured by the assistance of medicine, generally very dark, almost black, and frequently very offensive. At other times they assume a greenish brown colour, and exhale an acidulous and disagreeable odour. Occasionally they are pale, often clayey, and

of the consistence of soft putty, and, when broken down, exhibit a variegated appearance. After the operation of a cathartic, they are frequently slimy, and often gelatinous; and sometimes they are of a pale clay colour. The change of colour which thus presents itself has been generally attributed to the state of the bile; and such is doubtless the fact in many cases, but I believe in not so many as is supposed. On the contrary, I have great reason to conclude, that the colour, as well as other appearances of the stools, depend as often upon the morbid state of those secretions which are poured out from the mucous surface itself, together with the changes which the undigested aliments suffer as they pass through the lower parts of the canal, and mix with the mucous secretions in these situations, as upon the condition of the bile itself.

That the biliary functions and the constitution of the bile become disordered early in the diseases of warm climates, cannot be denied. Proofs of the fact are too common and too important to be overlooked; but we should not impute effects to wrong causes, or to fewer causes than actually exist, and still less should we fail of endeavouring to connect effect with its efficient antecedent. The same causes which produce indigestion, such as have been before alluded to*, will most directly tend to disorder the actions of the liver, and the constitution of the biliary secretion. Indeed, so immediately will these causes act upon this important organ, when assisted more especially by a high temperature and indolence, that it will be difficult for the patient himself to feel, and for the practitioner to ascertain, whether the stomach or the liver be the primary seat of disorder. In the majority of cases, however, the stomach evinces the earliest signs of disorder, when the testimony it affords is inquired into, or properly listened to. But in many instances the symptoms are so slight, and, even when important, so little attended to, that they pass unregarded until the actions of the liver become deranged, and heighten the primary disorder. When this extension of disease takes place, the state of the bowels and the appearance of the stools are matters of great moment, and should undergo the most careful scrutiny of the practitioner.

In the advanced stages of indigestion, the bowels are frequently disordered in the manner already pointed out; and the stools present those appearances previously noticed, in a more marked degree, with all the characters usually denoting morbid states of the bile. Sometimes the bile seems unmixed with the rest of the alimen-

* See sect. vi.

tary contents and fæces, as if it had been suddenly poured out from the gall-bladder, and, from the irritation it had occasioned, been quickly propelled along the intestinal tube, and discharged. At other times, owing to its admixture with the various matters taken in the way of food, drink, or medicine, and with the secretions of the mucous surface of the alimentary canal, it tinges the stools of every shade of colour. Occasionally, when the digestive power of the stomach is much impaired, and is connected with a lax state of the bowels, owing to the irritating combinations which the alimentary matters form in the intestines, pieces of undigested food may be observed amongst the fæces. In this more advanced form of disorder, distension after full meals is frequently severe, and is often attended with a sense of weight and oppression at the pit of the stomach and right hypochondrium, and with obstinate costiveness, followed by numerous loose motions, occasioning much smarting and tenesmus at stool; the motions being at first chiefly hardened and broken-down fæces, and afterwards a dark-brown or greenish-brown fluid, containing pieces of fæces of a lighter colour, and tenacious, putty-like consistence, and sometimes lumps of viscid mucus. The symptoms in such cases evidently depend upon the diminished power of the digestive process, having extended itself to the whole intestinal canal, occasioning inaction of the colon, and distension of it by the flatus given off from its contents; and likewise to the liver, impeding its actions and locking up its secretions, until, by the re-action of the vital energy upon the sources of irritation thus accumulated, and offending it, the amassed secretions and excretions are at last discharged, occasioning a temporary disturbance of the system, in proportion to the morbid changes which have taken place in them during the period of their undue retention.

In those cases of indigestion which are attended with loss of appetite and occasional nausea, although the patient becomes sooner alarmed, and the pathological condition may be more important, than in such cases as are attended with undue appetite and frequent craving for food; yet the disorder is often sooner removed. For where there is loss of appetite and nausea, there is usually much mental apprehension; hence the patient sooner seeks assistance, and more closely abides by the advice given him. Food, also, being but sparingly indulged in, and that which is taken under such circumstances being generally of a mild quality, the disorder is not perpetuated by indulgence in its chief cause; nor are the functions of the liver and bowels deranged by unduly concocted chyme, and by the irritating materials formed from undigested

aliment. When nausea, however, is a sympton of dyspepsia, and still more especially if the nausea is productive of retching and vomiting, the practitioner should then be watchful, and take care to examine fully into the state of the patient. The pulse should receive attention; for if it be quicker than natural, independently of the influence of retching upon it; if there be pain at the stomach or right hypochondrium, either upon pressure or without it, then the following pathological states are to be dreaded:—namely, the indigestion has gone on to produce an inflammatory state of the mucous coat of the stomach, or to occasion inflammation about the concave surface of the liver, or about the duodenum, or the gall-bladder and biliary ducts. It should, however, be recollected, that sickness at stomach, with pain and accelerated pulse, may sometimes be present without resulting from inflammation in the situations now pointed out; for these symptoms sometimes supervene, in the advanced stage of indigestion, from altered sensibility of the nerves of the stomach, independently of inflammatory action, although more frequently they proceed from this cause. That either condition may exist, more particularly that accompanied by inflammation, should be borne in mind by the practitioner, when the various circumstances of the case, and the aggregate of the symptoms, will guide him in forming his conclusions as to what actually is the proximate cause of disorder.

It is chiefly in weakened and nervous constitutions—in hysterical females and in gouty subjects—that we observe nausea, retching, and pain at the pit of the stomach, unattended by inflammation in some one of the parts already mentioned. The mode of living in warm climates is generally such as is productive of inflammatory action in these viscera; and therefore, when these symptoms supervene in the progress of indigestion, this consequence should be dreaded and guarded against. It should also be remarked, that the signs now noticed may be the consequence of the irritation of biliary calculi, either in the gall-bladder itself, or in the gall-ducts. When such is the case, the state of the pulse, and the seat and kind of pain, together with the appearance of the stools, and sometimes the character of the countenance and surface of the body, will inform the attentive practitioner. In all instances, the kind of pain or uneasiness complained of should be a point of interest: even when it is most urgent, the effect of pressure on the pained part should be tried; and even when it is not present, its non-existence should be proved by firm pressure, the practitioner causing the patient to make a full inspiration at the time when pressure is being made.

In every case where nausea, loss of appetite, and occasional retching, mark the progress of indigestion, the matters ejected from the stomach should be carefully examined; as upon the appearances which they exhibit, we are enabled to draw most important inferences respecting the extent to which disorder has proceeded, either in the stomach itself or in the adjoining viscera.

During the progress and advanced stages of indigestion, the sensibility of the whole nervous system is increased, the frame is more sensible of changes of temperature, and more susceptible of the impression of cold. The skin generally becomes dry and harsh when the temperature is at all lower than that of the surface of the body; and slight exposure to chills, or to a colder or moister air than usual, are productive of bowel complaints. Headach frequently occurs, the sleep is often disturbed, and the spirits generally dejected.

The Causes of Indigestion are, first, those which act upon the stomach indirectly, or by intermediate effects produced upon the body; and, secondly, such as directly invade the stomach itself, and are actually present in the viscus which they disorder.

The functions of the stomach are injured, not only by those causes which act directly on it, but by those influences also which impair the energy of the whole system. Of these latter, the most generally and continually operating are terrestrial exhalations. The depressing passions and anxieties of mind, also, although less general in their operation, are yet most efficient in the production of dyspeptic as well as of hepatic disorder; and when the former is the result of this cause, the latter disease is generally a concomitant.

In warm climates, and more particularly in the East, the supervention of biliary derangements upon disorders of the digestive function, is a consequence to which almost every experienced practitioner is alive; but still the subject is not the less deserving notice. The disorder of the stomach, which usually accompanies hepatic complaints, and often indeed produces them, is, however, too frequently overlooked, and the connexion disregarded, both in our speculations and practice. A similar remark may also be made respecting the origin of several disorders of the bowels.

A torpid state of the liver usually accompanies the imperfect performance of the digestive function, especially early in the complaint. This is in a great measure owing to the existence of a similar state of deficient energy of the vital actions of the liver to that which characterises indigestion. During this state of torpid function, the ingesta are retained longer in the stomach than in the

healthy condition of the organ, in order that they may undergo the necessary changes; at the same time, the bile is secreted in less quantity, or if it be secreted as abundantly as usual, it is frequently retained longer in the ducts and gall-bladder; hence it accumulates in these situations, and flows more sparingly into the duodenum. The result of this must necessarily be, that the chyme is slowly or imperfectly converted into chyle, and that the digestive process is retarded throughout the whole alimentary canal. A torpid state, however, of the liver, in warm climates generally, and in the East Indies more particularly, can be only a state of temporary disorder; but it is one necessarily tending to the production of ulterior disease. For, as the elements of which bile is formed abound in the blood, the secretion of this fluid will generally proceed sufficiently fast to load the gall-ducts and bladder to a degree which will either occasion its expulsion into the duodenum, or will irritate and excite the vascular actions of the liver itself; and the frequent production of these effects will necessarily occasion inflammatory disorder of the organ. But it is not only the simple accumulation of bile which is hurtful, when the energy of this viscus is insufficient to rid itself of its load; it is chiefly the morbid change which the constitution of the bile undergoes when thus retained which is productive of disorder, both of the liver itself and of the bowels into which it is poured. During the remora of the bile in the biliary ducts and gall-bladder, it becomes inspissated, darker in colour, and more acrid as respects its effects upon sensible structures. Hence the tendency to the supervention of inflammation upon torpid states of this viscus, both in the liver itself and in the mucous coat of the intestines, after the acrid bile has been let loose into them. Thus it will be perceived that functional disorders of the stomach are not only important in themselves, but also most deserving regard, as inducing disorder of the liver, tending to inflammatory disease of this viscus and of the mucous surface of the bowels.

SECT. II.—*On the Treatment and Regimen of the Functional Derangements of the Stomach in Warm Climates.*

In warm as well as in temperate climates, the first object of the practitioner is, to ascertain, as closely as is in his power, the causes productive of disorder, and the extent of derangement, as respects both the stomach itself and the adjoining viscera, which these causes have induced. The next point to which he should direct his views is, to remove these causes as far as he possibly can, and

to institute such a course of medical treatment and regimen as the circumstances of the case require. The causes which have been chiefly noticed as productive of stomach disorder, are those which should be especially removed; and this object having been insisted upon, with due decision on the part of the medical man, the following indications ought to be kept in view, in the exhibition of medicinal means,—namely, to remove the more urgent symptoms and complications which each case presents; to restore the impaired energy of the digestive functions; and to prevent a recurrence of the disorder.

The first indication can never be entered upon with any hopes of permament success, whilst the patient is allowed to indulge in those habits and courses from which the disorder springs. So long as he is allowed to overload and over-stimulate his stomach, the practitioner will prescribe the most efficacious remedies in vain. A light, low, and a bland diet ought therefore to be adopted before any medicine is taken; and this should be particularly and decidedly laid down by the practitioner, and a regular plan of diet and regimen entered upon by the patient previously to, or at least contemporaneously with the exhibition of medicine. This being premised, the various urgent symptoms and morbid associations which have supervened, should next be combated by suitable means. The acid and acrid eructations, which often prove hurtful after meals, will generally disappear as soon as a mild diet is adopted, and the quantity of the food reduced, so as to be in relation to the digestive energy of the stomach. If however, this symptom should still continue, gentle tonics may be combined with antacids and aperients, and a pill, consisting of a grain and a half of blue-pill and two grains of aloes, or of the aloes and myrrh pill, may be taken every night. The functions of the liver are very seldom unimpaired in the dyspepsia of warm climates; the treatment, therefore, should always be directed with some reference to the presumed condition of that organ. If it be in a torpid state as is frequently the case, and still more especially if there seem to be a loaded condition of the biliary apparatus, unattended with an inflammatory state of the mucous coat of the stomach, then the treatment may be advantageously commenced by the exhibition of an ipecacuanha emetic; for great benefit will be derived from the influence of retching, in procuring the expulsion of the bile from the loaded gall-bladder and biliary ducts, and in favouring a free circulation through the substance of the liver. Whatever means may be pursued in order to remove the dyspeptic condition, but

little progress will be made towards effecting a cure, as long as the functions of the liver and bowels are allowed to remain in a disordered condition. When the bile is secreted in an insufficient quantity, then small doses of the blue-pill, in combination with aloes, may be given nightly, gentle tonics and aperients being exhibited throughout the day; and this plan should be persisted in for a considerable time, and until all disorder is removed. In such cases as are characterised by irregularity of the alvine excretions, and by a morbid state of the biliary secretions, ten or fifteen grains of blue-pill may be exhibited with advantage every second or third night, and an aperient draught, consisting of equal parts of the compound infusions of senna and of gentian, with a little of the compound tinctures of aloes and of cardamoms, may be taken every morning; and when the secretions and stools are much disordered, a drachm or two of one of the neutral salts may be added to this draught, with great advantage. It will be generally observed, that this class of cases is most frequently met with amongst those who live upon much animal food and rich dishes: attention should, therefore, be paid to the diet of the patient. The institution of a regular course of aperients, and, in many cases, even of active purgation, should always be kept in view; and, in order that the functions of the stomach may not be disordered by the exhibition of such cathartics as possess acrid or irritating properties, the operation of those which are less offensive to the energies of the digestive organs should be promoted, by the use of injections. In cases of dyspepsia, attended with greater disorder of the functions of the liver and bowels than that which has been now considered, ten, fifteen, or twenty grains of calomel may be substituted for the blue-pill, recommended for the foregoing cases; and, in addition to the other means, a large blister may be placed upon the epigastric and right hypochondriac regions. Where the functions of the liver and bowels are much disordered, and especially when such disorder is characterised by an increased as well as a morbid state of the bile, the diet should then chiefly consist of farinaceous substances; little or no animal food ought to be taken; and active purgation should be resorted to, until the secretions contained in the stools assume a healthy character. As long as they present the appearances previously described, a deobstruent mercurial pill may be given with advantage every night, and an active purging draught the following morning; and this plan should be continued until all disorder ceases. We should not be led astray by the appearance of the motions voided on the first or second day of the purgative course;

for it very frequently happens, that the purges at first given accomplish no more, during that period, than the unloading of the colon and ileum of a part of their contents, and that part may not betray much disorder; and yet, after persisting in the use of purgatives for a day or two longer, the accumulated secretions, which have long remained locked up in the gall-bladder and biliary ducts, and adherent to the mucous surface of the alimentary canal, and the fæces and morbid secretions which have been long lodged in the cæcum and colon, are at last let loose; and I have often found, that measures necessary for the removal of them must be pursued even for a long series of days before the healthy state of function is restored.

Much mischief has arisen from the mistaken notion, that the very disordered state of the stools which is frequently present in the advanced stages of disorders of the digestive organs, is often the effect of the medicines which have been exhibited. But although the purgatives employed may change the colour of the motions, they by no means occasion the other morbid appearances they frequently present. Indeed, the colour, even when most opposite to the healthy tinge, if it arises at all from the operation of the medicine, can only result from its action upon secretions already of a very morbid condition. Their odour, putty-like consistence, variegated or marbled colour, dark-brown, greenish-brown, and inky appearances, and their viscid, tenacious, gelatinous, and often scybalous conditions, are by no means the result of the medicines employed. These various characteristics to which the practitioner cannot too closely attend, generally proceed from a vitiated state of the biliary and other secretions poured into the alimentary canal; and this arises from their long retention and accumulation upon the mucous surface; so that when they mix and combine with the fæcal matters passing through the colon, states of disorder, such as those to which I have alluded, are produced.

It not unfrequently happens, that states of congestion in the liver, and of inflammatory irritation of the mucous surface of the stomach, supervene in the advanced stage of indigestion. When such is the case, purgatives and enemas may be exhibited, a low and bland diet adopted, and leeches applied near the situation where fulness, weight, distention, and soreness indicate the existence of those forms of disorder. After these means have been adopted, and the urgent symptoms have been removed recourse should be had to such medicines as are likely to restore healthy action in the chylopoietic viscera, always keeping in view a free state of the

alvine discharges. In some cases of protracted indigestion, great fulness is observable in the situation of the cœcum, and in the course of the colon, particularly the sigmoid flexure, owing to inattention to the state of the bowels and habitual costiveness. The dyspeptic complaint may be considered in some respects as a consequence of this torpid condition of the large intestines, although it is more frequently a cause; but, however originating, there can be no question but that this state of the colon aggravates the disorder of the stomach, and should be removed as soon as possible. For this purpose, few better medicines can be prescribed than the combination of blue-pill and aloes, given at bed-time, and the bitter aperient draught taken in the morning. The effects of these remedies will be advantageously promoted by the use of the soap injection, or of the common gruel enema, in which some common salt may be dissolved, and a little assafœtida rubbed down.

Amongst other symptoms which require removal, those of acidity are the most troublesome. When these depend upon the quantity, richness, and irritating nature of the food, then the means of removing them are obvious. But they do not always proceed from this cause: they frequently seem to arise from a state of inflammatory irritation of the mucous coat of the stomach, and a deficient secretion of the gastric juice and mucus. The consequence of these conditions is, that the aliment is not converted into healthy chyme, but undergoes those changes to which its chemical affinities and the temperature of the body dispose it to enter into. These combinations being of an acid and irritating nature, the nervous sensibility of the organ is excited, and thus heartburn and pain in the stomach are produced. It is usual, in this variety of disorder, to prescribe antacids, which merely neutralise the acid which is formed, but which often increase that state of functional disorder upon which the acidity depends. Antacids are, notwithstanding, useful in such cases; but not as the chief agents—they are merely subsidiary means. They should be combined with aperients, and with such remedies as are best calculated to promote the healthy function of the liver and bowels. As an antacid, the carbonate of ammonia is perhaps the best, especially when given with the liq. ammon. acet. in any mild aromatic water, or in the simple decoction of sarsaparilla, or compound barley decoction. In all such cases, the state of the bowels should be attended to, and the operation of the gentler and more tonic aperients, which are here best adapted to the functions of the stomach, may be promoted by the occasional use of enemas, composed of ingredients similar to those already specified,

or of the decoction of camomile flowers, with some aperient extract dissolved in it.

Flatulence is another symptom which often occasions considerable distress, and even acute pain, in the advanced stages of dyspepsia. It will, however, be generally removed by the means already pointed out, more especially by a regularly open state of the bowels, and by the combination of aromatic and antispasmodic remedies with aperients and antacids. Where flatulence is frequently present to a great degree, we should always suspect the existence of a torpid state of function of the liver, with inactivity of the cœcum and colon; and we should therefore extend our remedial agents to these viscera, as well as to the stomach itself. The use of injections is here necessary, in order to unload the colon, and prevent the accumulation of fæces or morbid secretions in its cells.

Having relieved the more urgent symptoms, our next endeavour should be to impart strength to the digestive organs, and, through them, to the frame in general. The means already particularised will be productive of this result to a certain extent, particularly those which unload the alimentary canal of the offending materials which have accumulated in it, and impaired its energies. Until these be removed, it will be in vain that we shall attempt to give strength to the digestive organs; for whatever means we employ, if they accomplish not this effect, will frequently disorder the system, and be productive of general febrile irritation. In some cases, however, particularly in those who are much debilitated, tonics may be advantageously combined with aperients. The tonics employed should be of the mildest kind, and the least calculated to heat the system. Stimulating and heating tonics when prescribed before the strength of the digestive organs is in some degree restored, are generally hurtful, productive of thirst and fever, and often lead to the supervention of inflammatory disorder of the liver. Weak infusions of columba root, gentian, or camomile flowers, are at first the most suitable of this class of remedies to debilitated subjects; but as the strength returns, the cinchona, or cascarilla, with soda, may be prescribed with advantage. The sulphate of quinine may likewise be given in small doses; but, unless for the purpose of arresting the progress of intermittents, it is generally detrimental when taken in large doses, or when the use of it has been long persisted in. Even small doses, when prescribed for those who are liable to disorders of the liver and bowels, create considerable heat of skin and accelerated pulse. Its astringent effects are also such as

require the exhibition of aperient medicines. In all cases of dyspepsia, whatever be the symptoms or complications attending upon it, tonics even of the mildest description should be combined with gentle aperients; and when the functions of the liver and bowels are torpid, and still more especially if their secretions be morbid, suitable purgative remedies should be exhibited, at the same time that the strength of the digestive organs is promoted.

The Gentiana Chirayita of Roxburgh, or wormseed plant, is one of the best tonics generally used in India, and is well suited to the dyspepsia of weak persons, on account of its bitter and tonic properties, and the absence of any heating or irritating qualities. It may, as well as the common gentian, be used advantageously in combination with senna, for infusions, and, either with or without this latter, it forms, when thus prepared, an excellent vehicle for other tonics, or for aperient remedies, in the stomach and bowel complaints of warm climates.

Having removed the more urgent symptoms present during the advanced states of indigestion, and having restored the energy of the stomach, and regulated the functions of those viscera which are subsidiary to this organ, the last indication proposed is, to prevent the return of the disorder, by adopting that diet and regimen which the circumstances of the case seem to require. Persons who have once suffered from derangements of the digestive organs are extremely liable to a return of them, even after they have been completely removed by medical treatment, upon the least error in diet, and after any indulgence at table beyond the ordinary habits of the individual. On this account, the patient's prudence should never forsake him. His diet ought to be simple, consisting of few articles, plainly dressed, and easy of digestion. Animal food may be taken once a day in moderation; and if active exercise be indulged in, it may be partaken of twice, provided that the appetite desire it. Exercise, in order to be beneficial to those who have a weak digestion, should be regular, moderate, and resorted to at suitable hours of the day. Exposure to the sun ought to be avoided, and the exercise should always be short of fatigue.

CHAPTER II.

ON INFLAMMATION AND ORGANIC LESIONS OF THE STOMACH.

SIMPLE and uncomplicated inflammation of the stomach is an extremely rare disease, both in warm and temperate countries. Among many thousand cases, reported at length, I find but very few in which phlegmonous or acute inflammation of the substance of this organ was present in an uncomplicated form. It must not, however, be inferred from this, that the stomach is rarely inflamed. As respects the European residenters in India, this is far from being the case; for this viscus very frequently becomes the seat of inflammation, particularly as regards its mucous coat, owing to the extension of morbid vascular action from adjoining parts. It is only as a primary, an acute, and an uncomplicated disease, that gastritis is rarely met with. As it occurs within the tropics, it is generally complicated with disease of the liver, spleen, or small intestines, these organs having been the primary seat of inflammation, and the vascular disorder having extended itself to the stomach, owing to the operation of those predisposing and exciting causes whence gastritis usually proceeds. Inflammation of the stomach, however, may originate primarily in this organ, and even in a few cases be productive of disorder of the adjoining viscera. But this is seldom the case in the very acute or phlegmonous form of the disorder. In that form of gastritis which has its seat in the mucous coat of the stomach, and which is more insidious and more chronic in its progress, the extension of disease to other viscera is a much more frequent occurrence.

SECT. I.—*On the Symptoms and Causes of Inflammation of the Stomach, with the Appearances upon Dissection.*

When inflammation commences in the mucous tunic of this organ, and is confined to this texture, its symptoms and progress are very different from those which characterise inflammation of the substance of the stomach. The former variety of the disease,

which has usually been denominated the erythematous or erysipelatous, is often insidious and indistinct until very serious organic lesion has supervened. The latter is, on the other hand, most alarming in its aspect, and quick in its progress; and tends generally to a fatal termination, if not arrested by judicious means. The one is slow, and often obscure; the latter most acute and well marked.

The chronic or erythematic form of gastritis is generally confined to the mucous coat of the stomach, and, in its slighter grades, is a much more frequent form of disease in warm climates than is usually supposed. It supervenes to a greater or less extent, in the advanced stages of dyspepsia,—many of the more urgent symptoms of this disease being the result of an inflammatory state of the mucous coat of the stomach. It is also present in many cases of bilious inflammatory fever; and in these it may be considered as being generally induced by the flow of acrid and irritating bile into the stomach.

The symptoms generally indicating the existence of this form of disorder are, heartburn, pain in the region of the stomach, particularly after eating, accompanied with a sense of constriction always denoting obstruction in the gall ducts. There are present slight fever and thirst,—a red state of the fauces and edges of the tongue, whilst its surface is covered with a whitish or yellowish coating. At first, the desire for food is not much diminished; but the digestion is slow and painful, and accompanied with acrid, acid, and rancid eructations, and occasionally with vomiting. As the disease advances, the appetite disappears; there is frequent vomiting, with periods of comparative comfort, when food is entirely avoided, or taken in small quantity, and of mild quality. Attending this there is also much thirst, and a sense of heat about the præcordia and pit of the stomach. The functions of the bowels are often not much disturbed; they are sometimes, however, slower than natural, and occasionally diarrhœa is present. As the disease advances to ulceration, the pain, heat, and vomiting become more urgent. Cardialgia and constriction at the pit of the stomach are more frequently present; the patient becomes emaciated, and the fever assumes more of the hectic character. The matters ejected by vomiting early in the disease consist at first only of the substances taken into the stomach; subsequently they are mucous and glairy; and sometimes small whitish flocculi may be noticed in them. Soon after ulceration has supervened, which commences in the mucous follicles with which the villous tunic is studded, the matters thrown

off the stomach usually consist of a dark-coloured, grumous fluid. Vomiting and pain now become more frequent and more constant upon the ingestion of food or drink; and at last the patient sinks under the disease. On some occasions, this event is accelerated from the laceration of the bottom of some one of the larger ulcers, and the consequent irruption of the contents of the stomach into the abdominal cavity; peritonitis thus being produced, in addition to the former disease.

Inflammation of the mucous coat of the stomach may exist to a considerable extent without any complaint being made either of pain or sickness, and even, in some few cases, without the appetite being much disordered; but cardialgia, acid and acrid eructations, sense of heat and constriction, with slight fever and occasional anxiety at the præcordia, are generally present: and as soon as ulceration has supervened, then all the symptoms I have enumerated are usually present. Much mischief has arisen from the very exclusive manner in which the above symptoms have been ascribed to the worst forms of dyspepsia by nosologists, as if they were characteristic only of that disease. Although marking such disorder most undoubtedly, they seem also unequivocally to point out the existence of inflammatory irritation of the mucous coat of the stomach, particularly when they are constantly present, and attended with slow fever.

As this variety of disease seldom comes before the pathologist in his *post mortem* investigations, until it has gone on to ulceration, or the production of other morbid lesions, little can be said of its anatomical characters, further than as respects its consequences. Upon dissection, the coats of the stomach have been found thinner and softer than usual, at the same time that the villous coat has presented various traces of inflammation. In other cases, ulcerations of almost every dimension, and numerous in proportion to their minuteness, have been found conjoined with a thinning and softening of the tunics. In other instances, the coats of the stomach have been thicker and softer than usual, and the viscus more contracted; and marks of inflammation and ulceration have been found conjoined to this state. The ulcerations have been observed of various depths and sizes. Occasionally they have been very small and numerous; in other cases large and few. Sometimes they scarcely reached, as respects depth, the cellular substance connecting the mucous with the muscular coat of the stomach; at other times they have destroyed all the tunics, excepting the outer or peritoneal covering, which had given way in one or two places

before the retchings attendant upon the last stage of the disease; the contents of the stomach having escaped through the opening thus made, and produced peritoneal inflammation. The ulcerations have been generally most numerous near the pylorus, and at the cardiac orifice of the viscus.

Acute Gastritis generally supervenes in a manner more or less marked. It occasionally commences with chills or rigors; but this depends in some measure upon the cause which produces it. When it arises from the irritating operation of acrid or stimulating ingesta, there is seldom or ever any marked rigors, or even chills, although the extremities are often cold. There are generally dryness of the mouth, fauces, and tongue, great thirst, and a burning sensation, accompanied with great pain and anxiety at the pit of the stomach, præcordia, and hypochondria. The pain is attended with great tenderness at the epigastrium, dread of pressure in that situation, and nausea and vomiting, particularly after substances have been received into the stomach. Upon retching, the pain is often most acute, giving the sensation of something cutting or tearing the organ; and the perspirations, which are generally partial and cold, then become warm and profuse. The pulse is generally much accelerated, and of variable fulness and strength: sometimes it is full; at other times it is small and contracted; and it is occasionally both one and the other at different periods of the disease, according to the habit and strength of the individual, and the depletions which have been employed. Felt at the wrist, the pulse is generally weak, easily compressed, and occasionally scarcely to be felt, unless when the peritoneal coat of the organ is the tissue chiefly affected, when it is hard, or small and contracted. The acuteness of the pain, as well as the hardness and constriction of the pulse, seem to indicate the extent to which the more external coats of the viscus are affected; the less marked description of pain, or the dull and gnawing pain sometimes complained of, existing in connexion with nausea, vomiting, and anxiety at the epigastrium, and with a full, soft, or weak pulse, indicating the mucous and cellular coats to be the principal seat of disease. In the acute form of the malady, and after it has been fully formed and developed, the temperature of the trunk of the body is generally greater than natural, whilst the warmth of the extremities is either inconsiderable or below the natural standard. Attending these symptoms there are generally cramps of the abdominal muscles, and occasionally of the thighs and legs; sometimes also there are great weakness and pain of the lower extremities, with faintings; a cold, clammy coun-

tenance, cold perspirations, and almost total suspension of the secretion of urine, which becomes more abundant as the malady declines in severity.

As the disease advances towards an unfavourable termination, hiccup supervenes, with coldness of the extremities, a constant pumping up of the contents of the viscus, faintings, especially upon attempting to sit up, great depression of the powers of life, cold surface, with a clammy perspiration, painful spasms of the abdominal muscles, great increase of anxiety at the epigastrium, frequent sighing, a hurried and painful respiration, and extreme restlessness. If gangrene supervene, the pain and burning cease somewhat suddenly; but the face becomes colder and more collapsed; the surface colder, and covered with a more copious and clammy perspiration; and a manifest sinking of the powers of life is evident. The state of the bowels in acute gastritis is sometimes variable; but most frequently they are costive; and stools can generally be procured by the means of active glysters only.

When this disease terminates fatally, death has been very generally ascribed to the inflammation having run on to gangrene: but this termination is not so frequent as is supposed; for in several cases of acute inflammation of the stomach which have ended unfavourably, and which I have examined, complete gangrene of any portion of the viscus did not exist. In some cases ecchymoses under the mucous coat of the organ, were found in large patches, with softening of the inflamed tissues; and these have been mistaken for sphacelation and gangrene by those not much conversant in *post mortem* examinations. The extension of inflammation to the whole or greater part of the organ seems to have been the chief apparent cause of death; general inflammation of this viscus appearing to be incompatible with the continuance of life. Indeed, death seems to supervene before the inflammation has reached that particular termination; and in many cases where mortification has been observed upon dissection, I am much disposed to consider it as having supervened after death, and to have been met with in consequence of the length of time which had elapsed between the period of dissolution and that at which the inspection of the body had been performed. In those cases which are inspected in hot countries, generally within a very few hours after their death, the exact state of the diseased parts is more likely to be seen than in those which, dying in cold or temperate climates, are seldom examined until upwards of twenty-four hours, or even thirty hours, after dissolution.

Amongst the most frequent *causes* of gastritis in warm climates, are, the neglected or improper treatment of indigestion, the use of stimulating and irritating food, of spirituous and intoxicating liquors, and, amongst sailors, of salt provisions, conjoined with the abuse of spirits. Drinking cold fluids when the body is over-heated, is a very frequent cause amongst soldiers, especially in India, when on duty or on a march. The whole class of acrid and corrosive medicines and preparations, when received into the stomach in too large quantity, produces inflammation of the stomach, and destroys life by acting in this way only. Indeed, whatever by its properties, over-excites, irritates, or otherwise injures the stomach, when received into it, is productive of inflammation of this viscus, to an extent proportionate to the degree in which it possesses these properties.

Too much animal food, and highly spiced and seasoned viands, violent fits of passion, the regurgitation of acrid bile into the stomach, the sudden application of cold to the surface of the body when over-heated, injuries received on the region of the stomach, the acrid and rancid combinations formed in the viscus during severe fits of indigestion, excess of food, causing over-distension of the organ, and the excessive indulgence in the intertropical fruits, more particularly in such as are digested with difficulty,—are all occasionally exciting causes of this formidable disease.

The causes which have been already adduced as productive of indigestion are also those which most frequently predispose to, and excite inflammation of the stomach, and especially that form of it which has its seat more exclusively in the mucous coat of the viscus. Irregularities in living, as respects both the quantity and quality of the food, and still more particularly drunkenness, are, with exposure to night-dews and to wet, the most common causes of both varieties of the disease amongst soldiers and sailors in warm climates. Drunkenness seldom occurs, particularly in those not habituated to it, without causing some degree of inflammatory action of the stomach, especially of its villous coat; and this is generally accompanied with determination of blood to, and inflammatory irritation of the brain,—the disorder of the one organ, thus induced, predominating over that of the other, according to the state of predisposition to disease existing at the time of exposure to the exciting cause. In many, also, in addition to vascular disorder of the stomach and brain, drunkenness induces disease of the liver and bowels; and although the inflammatory state of the stomach is the first derangement caused by the undue inges-

tion of spirituous liquors, the disorders occasioned in other viscera tend, in many cases, to remove that of the stomach, or to mask its existence; so that, although by no means an uncommon, it is not so frequent a cause of gastritis in its uncomplicated form as may have been supposed, from the prevalence of the practice amongst soldiers. Most commonly, when the disease is induced by this cause, it is complicated with disease of the liver and bowels, the latter disorder being the more frequent consequence of this most baneful habit. It also proceeds from the extension of inflammation from the adjoining viscera, especially from the concave surface of the liver.

With respect to the *appearances* observed upon the dissection of those who have died of acute inflammation of the stomach, it may be briefly stated, that the vessels which run more externally in the stomach, and supply its peritoneal covering, are generally engorged with blood, and the capillaries injected: the omentum is also more vascular than natural. The internal membrane of the viscus is usually flaccid, collected into deep folds, owing to the constriction of the muscular coats; sometimes ecchymosed, owing to the transudation of blood from the capillaries underneath; generally inflamed, and varying in colour from a bright red, or crimson, to a deep purple or dark purplish hue; the inflamed portions extending in the form of broad patches, or wide bands or zones. This surface is sometimes covered with a limpid and viscid mucus; at other times, with a yellowish or puriform and thick matter; occasionally, with a whitish, thick, or concrete and albuminous substance; and on some occasions, with a thin ichorous or sanious fluid. The mucous coat itself is generally tumefied or thickened, softer than natural, and easily detached from the adjacent tissue, more particularly in the seats of the ecchymoses or subjacent sanguineous infiltrations. Upon dividing the texture of the organ, the coats are altogether thicker than usual, and their capillaries more or less engorged with blood; and the whole substance of the viscus is of a darker colour, and sometimes of a violet or deep purple tinge. In some cases, the mucous surface is abraded in parts, and a blackish grumous fluid is found in the cavity. Occasionally sphacelated spots or eschars are remarked; but these latter seem to be more frequently consequent upon death than the cause of it, unless in those cases of gastritis, which arise from poisoning by acrid and corrosive substances.

When the peritoneal coat of the stomach has been chiefly affected, and when the disease has arisen from the extension of

inflammation from the liver or spleen, then coagulable lymph is frequently found upon the external surface of the viscus, causing adhesions, or a gluing of it to the adjoining parts, particularly to the concave surface of the liver, to the spleen, and transverse arch of the colon. In some cases of acute gastritis, the spleen has been observed congested with blood, and softer and more friable than natural.

With respect to the diagnosis between inflammation of the mucous coat of the stomach and indigestion, it may here be stated, that there are very few symptoms, when taken singly, which can be relied upon as marking the absence or presence of the former disease. When, with the usual symptoms of indigestion, there is tenderness upon pressure at the epigastric region present in any degree, with slight fever, and more especially if there be sickness or nausea, a sense of heat at the pit of the stomach, occasional vomiting, and a white or loaded tongue, with red edges or point, and thirst, inflammation of the mucous surface of the stomach may be considered as actually present.

SECT. II.—*On the Treatment of Inflammation of the Stomach.*

The treatment of inflammation attacking this important organ, must be strictly antiphlogistic, and proportionate to its acuteness. In the chronic form of the disease, or that seated in the mucous coat, the same means as those which acute gastritis requires are equally necessary, but to a less extent. In the majority of cases, the application of from twenty to forty leeches to the hypochondria and pit of the stomach, followed by a large dose of calomel and opium, and a large blister on the epigastric region, at once arrest the disease. The exhibition of a large dose of calomel immediately after depletion is particularly indicated in this complaint. In the experiments made with this medicine*, in order to ascertain its mode of operation, I have shown that it acts most decidedly in diminishing vascular action in the stomach. When given, therefore, in combination with opium, after depletions have been prescribed, and at the time that counter-irritation is being performed, it is found to be the most powerful means in our power of arresting the disease, and of correcting the state of the secretions poured into the intestinal canal. In addition to the above remedies, purgative glysters ought to be exhibited from time to time, until the stomach

* See my "Sketches of the Diseases of India," p. 389.

can bear, without inconvenience, the presence of purgative or aperient remedies. These means should be repeated until the symptoms of the disease disappear, and should be resumed whenever the disorder returns, after having been subdued for a time.

When the disease assumes the acute form, and presents the symptoms indicating this state, blood should be taken from the arm, and a number of leeches applied to the epigastric region, in a decided manner, in proportion to the habit of body and strength of the patient, and severity of the disease. After these means, twenty grains of calomel, with two of opium, ought to be immediately exhibited, in order to diminish the vascular action of the viscus, and to prevent the return of the increased circulation, after the operation of bleeding. After the bleeding by the leeches *, a large blister may be placed upon the region of the stomach, with a view of transferring the increased vascular action from the interior to the surface of the body. The bleeding, both general and local, or the latter merely, ought to be repeated until the disease is subdued; and should be followed by the exhibition of the calomel and opium, and the external means mentioned above. The action of the bowels ought to be promoted by the injection of active cathartic enemata; and, as soon as the stomach can retain medicines, the saline mixture may be given, and full doses of calomel taken at bed-time, followed by an appropriate aperient in the morning.

When the inflammation arises from the ingestion of acrid, corrosive, and poisonous substances, the exhibition of an emetic may then be requisite; but in all such cases, the use of the stomach-pump seems to be more advisable,—and, under some circumstances, both may be resorted to with advantage. In many cases of inflammation of the stomach, an emetic has been prescribed, with the idea that the symptoms complained of by the patient were the result of acrid secretions disordering this viscus, and of vitiated bile regurgitated into it from the duodenum: but although the practice has been productive of no ill effects on many occasions, and has even in some instances done good, yet on others it has appeared to aggra-

* A number of leeches should be applied at once, sufficient to take away that quantity of blood which the physician wishes to remove; and the hæmorrhage from the bites ought immediately to be stopped, by means of the muriated tincture of iron, as soon as all the leeches have fallen off; for the bites of the Indian leeches are so deep and large, that the application of fomentations or poultices immediately afterwards, may be attended, in a short time, by fatal hæmorrhage. When the bites have ceased to bleed, then hot poultices may be employed, if they be frequently renewed, and closely watched.

vate the disorder. The cases which are most frequently benefited by an emetic, are those arising from the ingestion of unripe or indigestible fruit and unwholesome food. For these, the emetic should be prescribed as early as possible, and should consist either of ipecacuanha or of sulphate of zinc, given in divided doses, at intervals of five minutes, until a full operation is produced.

In those slighter cases of inflammation of the stomach following inebriety, the saline mixture, or that made from the carbonate of ammonia and lime-juice, has generally been serviceable; and when this has not allayed the inflammatory irritation, the application of leeches, followed by a blister, has generally removed disorder. As soon as the disease is arrested, then strict attention ought to be paid to the state of the alvine secretions and excretions; and these should be promoted by the milder aperients and laxative enemata, until health is quite restored. At first, whatever is given to the patient in the form of food or drink, ought to be of the most bland description; and care should be taken, both by himself and the practitioner, that the stomach be not offended by the ingestion of too stimulating and heating food, or of substances of difficult digestion, until the functions of the organ be completely restored. Even the most light and mild food should be at first partaken of most sparingly, and be persevered in until recovery is complete. But even when this end is completely fulfilled, the patient ought ever to recollect, that he is the more liable to an attack of the disease from having once experienced it; and he should therefore be most cautious as to his diet and regimen on all occasions.

The acute form of the disease may, in some cases, be completely removed by the decided employment of local depletion alone, and in weak and debilitated individuals, and those who have long resided in warm climates, local depletion ought to be preferred, especially as the quantity of blood which may be removed by the leeches of India may be determined with the utmost accuracy. Individuals of full habits, recently arrived in India, require often the most active depletions before the disease is arrested.

SECT. III.—*On Organic Disorders of the Stomach, generally the result of Chronic Inflammation, and occasionally met with in Residenters in Warm Climates, or in those who have resided in them.*

Organic diseases of the stomach, of a chronic description, are no less frequently met with in warm than in cold climates. Those

changes which proceed from acute attacks of gastritis, are also not unfrequently present; but both description of lesions are more often observed as the concomitants of some other diseases, and consequent upon them, than occuring in a primary form. Vascular action generally assumes more or less of an acute character within the tropics; therefore the usual consequences of such action may more frequently be looked for upon dissection. Yet those organic changes which have been generally ascribed to the previous existence of slow inflammatory action are occasionally observed, and, during the life of the patient, have often been misunderstood, and consequently have not been treated by the appropriate means. In many instances these derangements of structure have supervened to indigestion of long standing, which has been neglected or improperly treated; but here, inflammatory action, in a slow form, must have intervened between the appearance of the dyspeptic symptoms and the supervention of organic disorder. In other cases, the organic disease seems to have succeeded to symptoms of indigestion, without any signs of inflammatory action being apparent; or, perhaps, existing. Indeed, although organic changes of this important organ are very generally the results of inflammatory action of an acute or chronic form, yet they are by no means uniformly or exclusively the consequence of such disorder. In some few cases, the change observed upon dissection indicates an opposite state of the vessels to that of inflammation, and seems to evince the previous existence of deficient vitality of the organ, and diminished vascular action. These disorders are seldom made evident to the practitioner during the life of the patient, by symptoms sufficiently, or at all, marking their nature; and it is only by the presence of many of the usual signs of indigestion, together with loss of flesh, and a waxen appearance of the countenance, that he is led to infer the existence of chronic organic disease of the organ; but its precise nature is concealed from him until death supervenes, and he is allowed the opportunity of detecting it by the aid of the scalpel. Sometimes the appearance of the substances ejected by the stomach, when vomiting is a symptom, and the period after eating at which vomiting begins, will enable him to form some opinion as to the nature of the disorder; and even the report furnished by a rigid and careful examination of the hypochondriac and epigastric regions may farther establish the opinion thus formed: but yet, in the majority of cases, much uncertainty will exist as to its precise nature, although the particular organ diseased may be readily recognised.

In some few cases the stomach is found, upon dissection, very much dilated, and at the same time thinner in its parietes. This seems to have arisen from the extrication of gas in its cavity, which has merely distended it to an unusual degree. In a few instances, the stomach has been observed more than commonly large, and its coats, at the same time, flaccid and thickened, without any evident traces of recent inflammation; and this appearance has been more frequently met with in those who have been habitually addicted to excesses. Occasionally the stomach is of its natural size, and its coats paler, thinner, and softer than natural. Sometimes this condition of the parietes of the organ has been conjoined with ulcerations in the mucous coat, and which, when closely examined seemed to commence in the mucous follicles. Such ulcerations, although met with in all parts of the internal surface of the organ, were usually most numerous towards its pyloric and cardiac orifices. It seems doubtful whether these appearances are actually the result of inflammatory action; I am inclined to believe, that they neither necessarily, nor even generally, proceed from this cause.

The softened state of the coats of the stomach, often observed upon dissection of those who have laboured under disorders of this organ, and who have died either of them or of some other diseases in which the complaint of the stomach was merely a concomitant, is unequivocally, in the majority of cases, the result of inflammatory action, and is often accompanied with well-marked inflammatory appearances in some part or other of the organ. In some cases, however, no signs of inflammation have been present, either during the life of the patient, or upon dissection after death. How this state of the organ could have arisen, otherwise than from inflammatory action, it may, perhaps, be difficult to say, unless it be imputed to deficient vitality and imperfect nutrition of the parietes of the viscus, existing for a considerable time before death.

When softening of the stomach is met with, attended with marks of inflammatory action, the coats are usually thickened, and the mucous coat pulpy, and easily detached from the adjoining textures. If the inflammatory action has been of an acute character, or approaching to it, the mucous tunic is soft in proportion, the more easily lacerated, and darker in colour. On the other hand, it is the more indurated and pale, the slower or more chronic the inflammatory action which had previously existed. When the internal surface only has been the seat of inflammatory disorder, then the softness and facility of laceration are limited to this situation; and in proportion as the disease has extended to the adjoining tex-

tures, do they present these particular changes. Conjoined with this condition, the mucous follicles have been frequently found enlarged, and unusually prominent.

Thickening of the coats of the stomach is not an unfrequent appearance, and, with the foregoing lesions, has been often observed upon dissection of patients who had died of fevers, dysentery, and hepatitis; and this state has generally been found conjoined with either softening or hardening of the tunics, and in some cases with ulcerations commencing in the mucous coat, in addition to these changes. When the thickening of the coats of the stomach is attended with some degree of induration, and with a deposition, in the cellular substance connecting them, of a substance varying in consistence from the white of egg to that of cheese, and presenting an albuminous appearance,—then the organic change is far advanced in its progress to scirrhus, is generally the result of long-continued inflammatory irritation of the vessels of the part, and usually is accompanied with increased development of the follicular glands in the vicinity of, or seated in, the part, which soon becomes ulcerated, and thus the fatal termination of the disorder is hastened. This change generally is met with about the pylorus and cardia, in many cases constricting the apertures, and converting them into hardened and thickened rings, the interior of which is beset with ulcerations of various sizes, and with softened points.

The mucous coat of the stomach often presents patches of various colours and shades, from a deep red to a violet, purple, brown, or slate colour; and these are frequently elevated above the surrounding parts. This seems to have depended upon increased vascularity of the capillaries of the part, and enlargement of their diameters. More frequently these patches are situated about that part of the viscus which is covered by the spleen: sometimes they are found in other parts, and are often observed in the dissections of those who have died of remittent fever. This change has been most frequently remarked in those who have vomited during life dark-brown or black grumous fluids. This appearance of the ejected matters seems to have proceeded from the exudation of blood from the capillaries of the patches now noticed, changed by its remora in the stomach, and by admixture with the various fluids and matters contained in it. When chronic inflammation of the mucous coat of the stomach has proceeded to ulceration, and when the internal surface of the scirrhous indurations of the cardia and pylorus undergo such change, a similar appearance of the matters ejected from the stomach to that described above, is usually

observed. Sometimes these matters present an inky colour, and at others a greenish-black hue. This is owing, perhaps, to the admixture of acrid and dark-coloured bile with the morbid matters flowing from the diseased surface, giving rise to a deeper colour of these fluids.

The foregoing organic changes embrace those which are most frequently met with in the stomach, independently of acute attacks of gastritis, either in warm climates, or amongst those who have resided in them. In the majority of cases, these lesions have most evidently proceeded from long-neglected dyspepsia, and from the protracted irritation of the mucous coat of the stomach, by the acid and acrid compounds formed in it. In many instances they may be imputed to the abuse of spirituous and other intoxicating liquors; in some, to the use of hot spices and curries; and in not a few to the conjoined operation of all these causes.

SECT. IV.—*On the Treatment of Organic Diseases of the Stomach.*

On this subject little can be advanced, as the majority of the lesions now described are seldom manifested by any very decisive symptoms, beyond those which characterise the more urgent cases of indigestion, until they have advanced beyond the reach of medicine. When, however, the more severe symptoms usually ascribed to dyspepsia are present, with occasional vomiting of an albuminous, ropy, and whitish substance, floating upon the surface of, or swimming in, the other matters ejected from the stomach, with pain at the epigastrium, and anxious expression of countenance,—then the practitioner should dread the existence of a chronic inflammatory state of the stomach, with, perhaps, enlargement of the follicular glands; and he should be prepared to expect the supervention of ulceration, if this have not even then already taken place to some extent. In this state of matters, leeches ought to be applied to the region of the stomach, and repeated according to circumstances, followed by blisters; and mucilaginous and soothing medicines should be taken internally. Alterative doses of the milder preparations of mercury, with subcarbonate of soda, may be given from time to time, or continued night and morning; and cooling remedies, consisting of the nitrate of potash, or the acetate of ammonia, may be taken in soothing and mucilaginous vehicles. In all cases of this description, greater advantage will be obtained from living upon a mild, farina-

ceous, and mucilaginous diet, taken in small quantity, and perhaps often, and by avoiding the ingestion of any thing calculated to stimulate the stomach, or to generate acidity, than by medical treatment. The state of the bowels ought, however, to be attended to, and the operation of the above-mentioned gentle remedies promoted by the use of injections. The best internal remedies which can be taken are the hydrarg. cum cretâ with soda, or the simple or compound ipecacuanha powder. These may be also conjoined with the extract. taraxaci, or the extract of hop, or with small quantities of the extract. conii or hyoscyami. In many cases, the different preparations of opium may be taken with advantage; and the extract of poppy, and similar preparations may be resorted to when the symptoms are urgent. From all these advantage may be obtained; and in several instances, by using these means, and varying them according to circumstances, and by adopting and invariably pursuing a most rigidly abstemious and bland diet, the patients have recovered, when the usual signs of incipient ulceration were present.

In some cases, owing to the debilitated and sinking state of the patient, mild and mucilaginous tonics are requisite, and may therefore be prescribed; but they should be exhibited cautiously, and combined with other remedies of a cooling and soothing nature. The tonics which I have most generally adopted, are the decoction of Iceland moss, the decoction of sarsaparilla, weak infusion of columba, or of any of the mild mucilaginous tonics indigenous to India, or a weak infusion of catechu. These have been given alone or combined with the carbonate of soda, the nitrate of potash, or the liq. ammon. acet. and medicines of a similar nature.

The repetition of blisters upon the epigastric region, and the insertion of a seton in the side, are also means which ought not to be neglected, when others fail. More advantage than even these are calculated to produce, may be afforded by the early production of pustules by means of the ointment prepared with the tartarised antimony, and by keeping up a discharge from them. The occasional use of hot poultices, when the symptoms are urgent, has often been productive of benefit; but they should be frequently renewed, and persevered in for several hours.

From considerable experience of the beneficial effects of the nitro-muriatic lotion in indolent ulcers, I think that the use of water, rendered agreeably acid with equal proportions of the nitric and muriatic acids, as the common beverage, or three or four times daily, is calculated, in addition to the measures already stated, to

be of considerable service. The trunk of the body may be also sponged twice daily with the same acid solution. From the experiments detailed in the "Sketches of the Diseases of India" (p. 193), it is evident that the mineral acids dissolve and separate the viscid mucous secretion that sometimes is formed in the course of the disease, and lines the internal surface of the alimentary canal; and it would appear, from the experiments of Leuret and Lassaigne*, that "when the villous coat of the duodenum was exposed and cleaned, and then touched with diluted vinegar, the membrane exhaled a clear fluid, and the choledochus duct discharged much bile and pancreatic juice." These considerations, added to the fact that the gastric secretions are also acid, must show that, in cases where the healthy character of the gastric secretion is altered by disease, the nitric and muriatic acids may be used with benefit.

Great attention should be paid to the beverages used by the patient. The decoctions of barley, either the simple or compound, may frequently be taken with advantage, and common toast water may also be used, either simply, or rendered agreeably acid by equal proportions of the nitric and muriatic acids, as recommended above. But on all occasions he should avoid every kind of spirituous or fermented liquor, and adopt whatever may prove most soothing and least offensive to the sensibility of the stomach. Imperial, made with a small proportion of cream of tartar, and weak lemonade, or barley-water, with a small proportion of nitre, may be tried, and taken as long as they are found to agree with the diseased organ.

SECT. V.—*Precautions for the Adoption of those who are subject to Disorders of the Stomach upon Change of Climate, as respects Diet and Regimen, Air and Exercise.*

I shall close the consideration of the Disorders of the Stomach by reference to some precautionary measures, having particular relation to those who are liable to disorders of this organ upon change of climate, and shall make some suggestions as respects diet and regimen, air and exercise. The general observations previously stated will be considered in these as in all other cases to which allusion is made in this work, to apply; but it is necessary

* Recherches Physiologiques et Chimiques, pour servir à l'Histoire de la Digestion. Paris, 1825.

here also to give to the intertropical residenter some precautions which it is important he should observe upon departure from, and return to, his native country.

Upon departing from Europe, the visitor of warm countries should endeavour to adopt that kind of diet and regimen which he intends to pursue upon his arrival, provided that both the one and the other be on an abstemious or moderate scale. He should avoid, as much as possible, the use of salted provisions upon the voyage; and water should be his principal beverage. The state of his bowels ought regularly to be attended to; and he should take as much exercise as circumstances will admit of, without exposure to the sun. The same precautions ought to be observed upon his arrival in the country: and if any of the symptoms of disorder of the stomach supervene, he should endeavour to remove them by abridging his diet, rather than by taking medicine of a stimulating or tonic nature, such as brandy bitters, which often aggravates the disorder, or procures merely a temporary relief. If medicine be at all employed, it ought to be of an aperient and cooling kind. Those who have delicately constituted digestive organs should avoid the fruits of the country upon their arrival, unless they be perfectly ripe and mild, and then they should be taken in small quantity. Above all, recent visitors of warm climates ought to avoid, as much as possible, all exposure to the direct rays of the sun; yet exercise is absolutely requisite, and should be used, without incurring fatigue, in the morning and after the sun has declined in the evening, and in every respect they should rigidly conform to the injunctions laid down for their guidance in a former chapter.* They should also conform their dress, as far as circumstances will permit, to the temperature of the climate and to the sensations of the individual. The subject of dress is of greater importance to Europeans in India than is generally considered.

More attention should be paid to the digestive organs, upon removal from an intertropical to a cold or temperate country, than the subject has usually received. Many, in consequence of the want of such attention, have left a warm climate in comparative good health, and have experienced disease upon their arrival in that country to which they had been so anxious to return. This has arisen entirely from their neglect of warm clothing upon their first approach to a colder temperature, and to insufficient care of the functions of the stomach, liver, and bowels. When an individual,

* See page 127, *et seq.*

whose cutaneous surface has constantly been kept in a state of free and copious perspiration, is exposed to the chills of a colder climate, the balance of the internal and external circulation, which had been so long maintained, is disturbed, and the blood is repelled from the surface to the internal viscera, which, in time, suffer from the load, in proportion to the disposition to disorder which they may possess. The liver, bowels, and stomach itself, often suffer more or less in this way, and not unfrequently the lungs become the seat of disease from the same cause. Now the indication in those cases is sufficiently apparent. The low temperature of our native climate suppresses an abundant secretion and excretion, which had been maintained upon the surface of the body for many years in a hot country, and which cannot be permanently restored whilst exposed to a cold atmosphere. We should, therefore, most obviously look for some other natural outlet for the exhalations and excretions now diminished or entirely checked upon the cutaneous surface; and at the same time maintain the accustomed transpiration of the skin by every suitable means. Conformably, therefore, with this view, the healthy functions of the stomach should be promoted by light and digestible food taken in moderate quantity, and by temperance and regularity in the hours of diet and repose. The functions of the liver should be regularly attended to, and the actions of the bowels promoted by appropriate means. Amongst these, the blue-pill, or this with the aloes and myrrh pill, or the latter only, should be taken at bed-time, according to circumstances; and a draught, consisting of infusions of gentian and senna, with some neutral salts, in the morning. These may be repeated, or continued, according to the effects produced and the peculiarities of the case. Warm clothing ought to be adopted and proportioned according to the temperature of the atmosphere, and the temperament and ailment of the individual. Flannel should be worn next the skin, and the feet be especially kept warm at all seasons.

The chief danger to which those returning to Europe with impaired digestive organs are liable, is the supervention of either hepatic or pulmonary diseases. Many cases have occurred of individuals who had never complained of disorder in the liver whilst they remained in India, and yet, upon residing for some time in England, and paying little or no attention to the state of their stomach and bowels, hepatic disease of the most serious aspect had supervened, and in some cases proved fatal. Upon arrival in Europe, the invalid should endeavour to take exercise, especially upon horseback; and even those who have returned with little or

no ailment should take sufficient exercise to promote the cutaneous functions, without carrying it to the length of fatigue, and, equally with those who have impaired their digestive functions and their health generally, ought to attend most scrupulously to the early signs of disorder in the chest; and, upon the first appearance of cough, or oppression, or tightness, or pain in this cavity, resort to depletions, and to such remedies as are calculated to promote the actions of the great secreting viscera and surfaces, and to carry off any morbid secretions or excretions which may have accumulated in the first passages. But it is not a mere discharge of such accumulations which ought to be attempted, but a continued action of the secreting and excreting organs ought to be promoted; and the diet, at the same time, should be regulated in such a manner as to diminish vascular action when it exists, and to keep up the strength, so as to enable suitable purgation to be instituted when debility commences. Much advantage will occasionally be experienced from a dose of calomel given at bed-time, and followed by an active cathartic draught in the morning. The common black draught will answer the purpose sufficiently well; and will carry off those morbid secretions which will continue to accumulate from time to time in those who have resided in a warm climate, after they have returned to their own country. But the occasional exhibition of this more active medicine should not prevent the patient having recourse to gentle aperients, in order to keep up a regular action of the liver and bowels. For this purpose there is scarcely any thing better suited than the pills already noticed: and when chronic disorder exists about the liver, the artificial Cheltenham salts may be taken in addition, and the natural waters resorted to when the patient arrives in England.

BOOK III.

ON THE DISEASES OF THE LIVER AND OF THE BILIARY APPARATUS.

Diseases of the liver may be considered as endemic in the eastern hemisphere. The annual average per-centage of hepatitis in the East Indies is at least treble what it is in the western hemisphere. In the different divisions of the Bengal army, the annual per-centage of inflammation of the liver varies from three per cent. to twenty-five, giving an average of thirteen per cent. in the effective strength. But this calculation is made with the *nominal* admissions. Calculating, however, from the imperfect data in our possession, the *actual* per-centage of admissions is much below what is now stated, and would appear to vary in this presidency from two to sixteen per cent., averaging between eight and nine per cent. in the effective strength. In the different divisions of the Madras army, the *actual* admissions are ascertained with more precision; and although, of course, much below the nominal admissions, they vary in these divisions from six to thirty-five per cent.,—the lowest per-centage being in these provinces which more nearly approach those under the Bengal presidency, and the highest in the more southerly and most parched districts. These facts render it probable that the difference in the per-centage of diseases of the biliary organs, particularly acute inflammation of the liver, is dependent, in a great degree, upon the nature of the soil and climate, and in the mean annual height of temperature; hepatitis being more frequent in the Coromandel coast and southern provinces of India, where the annual range of temperature is highest.

The influence which various morbid actions exert on the biliary secretions, the numerous changes which that secretion undergoes in disease, the particular local and constitutional affections which these changes induce, and the variety of disease and morbid structure observed in different countries in the substance of the liver, are objects worthy of more serious attention than has hitherto been bestowed by practitioners in the different regions of the earth.

The annual average of actual admissions of hepatitis in the effective strength of the Madras European army is somewhat more than twenty per cent.; and in the Isle of France and other parts of the same hemisphere, the annual per-centage ranges from eight to eighteen in the effective strength. But the number of cases given in the official returns as inflammation of the liver, forms only a part of the many instances in which the functions and structure of the biliary apparatus are diseased; for there are comparatively few cases of fever and dysentery, and even of diarrhœa and cholera, in which this part of the animal economy is altogether unaffected. Hepatitis, therefore, appears in the returns only when the liver has been the organ affected, or when it has betrayed disorder in a prominent manner. It is well known, however, that in a great many cases which have appeared, and been stated in official returns, as fever, as dysentery, and as chronic diarrhœa, dissection has disclosed most extensive disease in the liver. In some of these cases disorder of this viscus had never been suspected, and in others it had become manifest too late to be remedied. I am disposed to extend this remark to the fevers and dysenteries of the western hemisphere; and I believe that, although the annual average per-centage of admissions of hepatitis in the effective strength is as low as two per cent. in some of the West Indian colonies, and never above ten per cent., as stated in the official returns, averaging altogether as low as four and a half per cent. annually,—disorders of the liver are actually more frequent than those returns make appear, and that those disorders are, in a great measure masked, as in the eastern hemisphere, by concomitant or consequent disease.

But besides those more palpable instances of hepatic disorder, which appear in the official returns as inflammation of the liver, being immediately recognised as such upon their admission into hospital,—and in addition to those cases of fever, dysentery, and diarrhœa, wherein the liver has been either in a state of co-existent or consequent disease,—there are other instances in which this organ is seriously affected; and yet they seldom come under treatment until more important disease has supervened, either in the liver itself or in some other viscus;—the primary disorder of this organ being productive of the consequent disease, which assumes the prominent features and attracts the whole attention of the practitioner, while, in fact, the primary disorder on which it depends is overlooked, and undiscovered unless when disclosed by dissection.

CHAPTER I.

ON FUNCTIONAL DISORDER OF THE BILIARY ORGANS.

UNDER the head of functional disorder may be embraced all those conditions of the liver and its appendages which depart from the healthy state, and are productive of uneasiness to the patient, and lead to further disease. These conditions, although affecting the quantity and quality of the blood circulating in the liver, and of the fluid secreted by it, are not necessarily allied to morbid structure, although, when neglected or improperly treated, they often terminate in inflammatory states and in alterations of the organization of the organ. Indeed, these latter derangements generally proceed from this source, either immediately upon the first functional disorder, or after repeated or long-continued attacks of it. Amongst the disorders of the biliary organs embraced under this head, most frequently occurring in warm climates, are, increased secretion of bile, congestion of blood in the liver, congestion of bile in the biliary ducts and gall-bladder, and torpid function of the liver itself.

SECT. I.—*On Increased Secretion of Bile.*

One of the earliest effects of change from a cold or temperate climate to a very warm one, upon the European constitution, is an increased secretion of bile. This has been ascribed by Dr. Johnson to a sympathy existing between the hepatic functions and those of the skin, the former being increased when the latter is augmented. That an increase of these functions is generally coexistent, particularly soon after the European has arrived in an intertropical country, cannot be questioned; but, it cannot be readily conceded that the increase of the biliary secretion is so immediately the result of sympathy with the functions of the skin, as this author infers. The sympathy between the skin and the internal viscera generally, I admit; and in the treatment of disease, a knowledge of, and due attention to, the fact, are matters of the very first importance; but I am much more inclined to adopt

another explanation of the phenomenon of increased secretion of bile, which has been assigned to it by other pathologists. It has been ascertained, by the experiments of Crawford, Lavoisier, and Sequin, and of Dr. Prout and Dr. Fyfe, afterwards repeated by Dr. Copland, in a warm climate, that the quantity of carbonic acid gas, formed by respiration in a given time, is much diminished in a high temperature, and under circumstances which lower the powers of life. This being established by numerous experiments, undertaken by individuals entirely unbiassed by previously conceived opinions on the subject, it becomes a basis on which much important speculation respecting the origin of several intertropical disorders may be founded.

If less carbon be evolved from the blood by respiration, in a given time in a warm climate than in a cold one, whilst the quantity of carbonaceous materials conveyed into the circulation is equally great, it must follow, that this substance will soon be greatly in excess, provided that the function of eliminating it from the blood, (which is discharged by the lungs, in a diminished ratio in a warm climate,) is not performed by some other organ. Thus, therefore, there is one of two states to be expected to supervene in Europeans upon their arrival in a warm climate, namely, that owing to the diminished excretion of carbon through the medium of respiration, this substance will be either in excess in the blood, or be eliminated by the vicarious increase of the function of some other organ. But bile is chiefly formed of carbon and hydrogen; therefore, when this secretion is increased, a larger quantity of carbon will be eliminated from the circulating mass, and thus the excess of this substance in the blood will be guarded against. The observations now offered with respect to carbon, may be equally well applied to the quantity of aqueous vapour given off from the blood in the lungs; for, in a high temperature, when the air is already saturated with moisture, a much less quantity of aqueous vapour will accompany the expired air, than in a cold and dry state of the atmosphere; and thus the aqueous part of the blood will be in excess, if it be not excreted in greater abundance by some other part of the animal economy. Hence it is that the fluid excretions of the skin, the secretions of the liver and of the mucous surface of the alimentary canal, become so frequently augmented in warm and moist climates; and when this is the case, a considerable portion of carbon is also evolved from the system, in the state of carbonic acid gas.

From the experiments of the physiologists alluded to, it may be inferred that, owing to the diminished formation of carbonic acid gas in the lungs, during a high temperature of the atmosphere the secretion of bile may be expected to be increased, and the liver may be considered, in a warm climate, as performing an increased office, in proportion as the influence of respiration upon the blood in the lungs is diminished. Thus we have a very important fact in the causation of those disorders which are attended with an increased secretion of bile accounted for, namely, that such disorders increase in frequency and in severity with the rise in temperature, and with the prevalence of those other causes which diminish the changes produced upon the blood by respiration. Dr. Prout and Dr. Fyfe found, that the changes induced upon the blood by respiration are diminished during sleep, by the depressing passions of the mind, by fatigue, by the use of vinous and spirituous liquors, especially when taken upon an empty stomach, by low diet, by mercurial irritation, and by whatever diminishes the powers of life. Dr. Copland, moreover, found that the changes effected by the air in respiration, in those experiments which he performed in a warm climate, were even to a less extent, and furnished much less carbonic acid gas in a given time, than those experiments which he performed in an artificially increased temperature in a cold climate; and this further diminution of the changes effected by respiration upon the atmosphere in a very warm climate he imputed to the presence of malaria, and to the circumstance of more moisture existing in an intertropical atmosphere than in an artificial high temperature in a cold country. The relation subsisting between the temperature of a country and the prevalence of diseases characterised by increased secretion of bile, and disorders of the biliary organs, is thus accounted for.

That increased secretion of bile is evident in all Europeans immediately upon their arrival in India and other warm climates, cannot for a moment be doubted by any who have visited intertropical countries, or who have observed the character of the disorders occurring in temperate or cold regions during seasons of unusual warmth; and it will be as readily conceded, that this increase and disorder of the biliary secretions are in proportion to the elevation of the temperature into which the natives of cold climates are transported. But not only are the disorders experienced by Europeans upon their removal into a warm country, characterised by an exuberant secretion of bile, but the excess of this secretion

generally, in the first instance, is the immediate cause of disorder,—all the derangements first experienced arising from this cause, and usually disappearing when it is removed. Of this fact, many cases might be adduced in which diarrhœa, nausea, and general disorder from increased secretion and accumulation of bile have been produced.

These cases constitute some of the slighter forms of disorder resulting from the influence of a warm climate upon Europeans. But it is only one of several modes in which the functions of the biliary organs become deranged; the chief origin of such disorder, in almost every case, being more or less dependent upon the manner in which the function of respiration becomes affected in Europeans, upon their removal into a higher range of temperature than that to which they are adapted by organisation and habit. An increase of the biliary secretions in a warm climate is a necessary consequence of a diminished state of function in the lungs; and, in consequence of such diminution of the changes effected by respiration upon the blood, during considerable elevations of temperature, those materials which should be conveyed from the system by the respired air must soon be in excess, provided that the supply continues undiminished; or, in other words, provided that these materials are carried into the circulation, through the medium of the digestive organs, and owing to the nature of the food, in greater quantity than they are eliminated from it by respiration, unless some other organ supplies, by a vicarious state of its function, the diminished office of the lungs. The organ which takes upon itself this vicarious office, is the liver; and it seems to perform this duty more from the circumstance of those materials whence bile is formed being conveyed to it in the blood in much greater abundance than usual, than from any absolute or primary increase of its vital actions. The abundance of the constituents of the bile conveyed by the circulation to this viscus, seems to facilitate its operations in the formation of this fluid, and to stimulate it to increased action; and if this secretion be not duly discharged from the biliary ducts and gall-bladder, but, either from the state in which it is secreted, or from any other cause, accumulates in these situations, until it acquires properties of an irritating and hurtful tendency, much constitutional disorder may be the result; and this disorder may assume various features, according to the habit and temperament of the patient, and the concurrent circumstances in which it may supervene.

To illustrate this part of my subject, I shall *first* offer some

remarks, showing the forms of ailment more generally met with in practice, proceeding either from an increased or disordered condition of bile; and, in the *second* place, make a few observations upon certain points connected with this department of pathology, and upon the measures which should be adopted in order to moderate the exuberance of this secretion, when in simple or morbid excess.

First, increased secretion of bile seldom takes place without a change from its healthy characters. During an exuberant flow of this fluid, a considerable portion of it is conveyed into the gall-bladder, where it undergoes important changes, and acquires more acrid properties. With an increase of secretion also, an augmented flow of blood generally supervenes; for, conformably with the laws generally observed to obtain in the animal economy, there can be no increase of secretion without an augmented supply of the fluid or materials whence such secretion is derived. This augmentation in the flow of blood is frequently still greater when the secretion is possessed of acrid and stimulating properties: for acridity is productive of irritation; and wherever irritation exists, an increased afflux of the circulating fluid is the necessary consequence.

This increased afflux of blood may amount to what is usually called active congestion, or increased determination, in the first instance; and this state, if not arrested by treatment, or not subsiding spontaneously, may run on to inflammatory action, differing in degree according to the peculiarities of individual habit and temperament, and the circumstances of the case. But the increased determination of blood to the liver is not always to be considered as a necessary consequence of an increase of the biliary secretion, although I believe that more generally active determination of blood either precedes or is consequent upon an augmented secretion of bile. From a close inspection of the appearance of the blood, when taken from a vein during the premonitory stage of intertropical diseases, and a comparison of it with the blood drawn afterwards, when a full secretion of bile had been for a considerable time going forward, I am satisfied that, in the first stage of disorder there existed certain materials or elements in the circulation which were incompatible with the healthy discharge of the functions, and upon the presence of which a great share of the disorder seemed to depend. My attention was first attracted to this subject, many years ago in Hyderabad, when bleeding a man suffering under acute rheumatism, attended with a torpid state of the liver. In this case the blood presented a very dark or pitchy tinge, with an oleaginous

appearance on the surface,—characters which disappeared after the actions of the liver had been for some time established. The result in this case raised a belief in my mind, which much experience has fully confirmed, that those materials or elements whence bile is formed existed in the blood greatly in excess upon the first occasion of depletion, and were productive of much constitutional disturbance; and the very copious discharge of green bile, which is generally observed to follow upon this dark and thick state of the blood, resulted from the abundant supply of the constituents of the bile which this condition of the blood furnished to the liver. When the functions of the lungs and of the liver become diminished at the same time, the one owing to a permanent cause—the high range of temperature, the other to temporary and accidental circumstances, whilst the blood continues to receive that exuberant and rich supply of carbonaceous and hydrogenous materials which animal food furnish, the supervention of much serious disease cannot be doubted, and in general it first makes its appearance in disorder of the hepatic functions.

During the first impression of the exciting causes of disease, and for some time afterwards, the nervous system has its energies greatly impaired; and this state is more remarkably observed during the premonitory period of disorder, which answers to the cold stage of fevers. In this state of disorder the functions of all the viscera are considerably diminished, and, consequently, those changes which are effected upon the blood by the secreting viscera are but imperfectly performed. Congestion of the blood in the large veins and internal viscera, frequently supervenes; and during this state, the venous character of the blood, and the predominance of its carbonaceous and hydrogeneous elements become still further increased; so that if the powers of life did not re-act under the load of congestion by which they are nearly overwhelmed, and thus enable the great secreting viscera to re-establish their functions, and remove a great share of the cause of disorder, life would soon become extinct. In many cases, when the efficient cause of disorder is very powerful, and the venous characters of the blood decidedly marked, and attended with extreme congestion of the internal viscera, the powers of life actually sink under the load, without any effort, or with very inefficient efforts to remove it. Such instances are met with in the cold fit of some agues, when the constitution of the patient has been much impaired, and in the early stage of the epidemic cholera. In the latter disease, the blood taken from a vein possesses the venous characters in the highest

degree; and even the blood flowing from an artery, at the time when internal congestion is at its height, presents well-marked venous characters. In such cases, the efficient causes of disease affect the energy of the nervous system, and co-operate with the influence of climate upon the circulation in impairing the activity of the eliminating and secreting functions of the internal viscera, and in diminishing the purity of the blood; and this impure state of the circulation, and the accumulation of hurtful materials existing in it, unfit it for the offices it is destined to perform, and further tend to perpetuate, and even to increase, that condition in which its own disorder depends, and to annihilate at last the powers and functions of life.

When sufficient energy remains in the system to enable the chief secreting viscera to act, to carry forward the blood circulating towards them, and to form those secretions which it is their office to elaborate from the blood,—and upon the due elaboration of which the pure and healthy state of this fluid depends,—the healthy actions of the system are restored, and the animal machine assumes its usual tenour of action, if no part of its very complex organisation have received injury during the struggle.

Not only may the purity of the circulating mass be affected in the very general way now argued for, and of which familiar instances may be adduced from amongst fevers, cholera, and dysentery, but owing to causes acting in a partial manner, or to a limited extent, upon the economy, the circulation in particular organs, or in a particular series of vessels, or in the branches of a particular venous trunk, may assume appearances of impaired purity, and may possess the venous characters, as respects darkness of colour and diminished state of fluidity, in a much greater degree than the blood circulating in other parts of the system. From the appearances of the fluid when drawn by leeches and scarification, in different parts of the body, when suffering under symptoms of congestion, or of its opposite, increased arterial action, I am fully convinced that very dissimilar states of the circulation may exist in different parts of the body at the same time, as regards its sensible properties. Blood, for instance, drawn in the vicinity of, or from a part suffering under congestion of its veins, will be possessed of very distinct characters from that taken from another part even near to the same spot, in the same individual, where no such interruption or congestion is present. This is a point which must be familiar to every experienced practitioner, and is of more importance than has been commonly attached to it; for, in cases

where local congestion is considerable, the same dangerous consequences, which have been already stated as sometimes supervening upon a general state of venous congestion and vascular impurity, may supervene locally, and the functional capabilities, or even the vitality of the part, may suffer from the distension, and the condition of the blood with which it is loaded. In such cases, as indeed in the majority of those in which the vascular system is more generally affected, and the blood itself loaded with effete and noxious elements, the object is to promote circulation, at the same time that we attempt, by exciting the secreting viscera to increased action, to procure the discharge of the hurtful materials. Hence it is that general depletions, in a warm climate, are beneficial when the evil is extensive; and local evacuations, when a single organ or set of vessels suffer the chief load of disorder.

During the period of increased secretion of bile, the irritation occasioned by the flow of the stimulating fluid along the mucous surface of the alimentary canal will be productive, in many cases, of much constitutional disturbance,—will occasion great thirst, giddiness, and pain in the head,—an accelerated pulse, and a white tongue,—thus giving rise to the phenomena which characterise a slight attack of fever, and even to those of bilious inflammatory fever.

SECT. II.—*On the Treatment of Increased Secretion of Bile.*

From what has been already advanced, it will be seen that the thick and rich blood of Europeans, loaded as it is with an excess of those materials or elements of which bile is composed, forms the immediate and principal cause of hepatic disorders amongst them; and that this state of the circulation prevails in consequence of a diminished change being effected upon the blood by respiration, compared with that which it undergoes in cold or temperate climates, and of the copious supply of these elements conveyed into it from the mode of living followed by Europeans residing in warm countries. It follows from this, that in order to procure exemption from those ailments, the European visiter or residenter in a warm climate should conform his diet and regimen so as to moderate or diminish the excessive supply of chyle, and should live principally upon those articles which, while they convey sufficient nourishment to the body, contain but little of those elements of which bile is constituted. The observations which have been already offered upon the subject of diet, and the mode of living there recommended, if at all closely followed, will prove as bene-

ficial in this point of view as any thing that may be further advanced upon the subject.

When bile is secreted in an excessive manner it often possesses very acrid and stimulating qualities, particularly if retained for any time in the gall-bladder and biliary ducts; it is, therefore, essential to dilute it, and thus to render it less irritating during the time it is passing through the system; at the same time that attention should be directed to guard the mucous lining of the intestinal canal from the injury it may experience from the flow of a highly stimulating fluid, and particularly from its retention in any particular part of the canal. For this purpose, ipecacuanha emetics are useful when there is no determination of blood to the head, or any peculiar irritability of stomach to contraindicate their employment. Emetics ought to be followed by copious draughts of weak tea or of warm water; and afterwards, emollient draughts, with the sub-carbonate of soda, effervescent draughts, &c., may be given with advantage. Amylaceous and other emollient enemas, will prove most serviceable in obviating the effects of acrid bile on the intestinal canal; and laxatives of a cooling nature, such as the supertartrate and tartrate of potass, will always be found useful. When, however, the disordered biliary secretion is impeded in its course downwards, purgatives will generally be required to bring it away with the requisite celerity; for if it be allowed to remain in any particular part of the tube, serious disorder may be induced by it in the mucous tunic of the part.

It very frequently happens, that during an increased flow of bile, the mucous surface of the intestinal canal, and even of the stomach, when the bile regurgitates into this viscus, suffers considerable irritation, even amounting to inflammatory action, from its irritating properties. In such case, the patient generally complains of pain, either in the situation of the duodenum, in the stomach, or in the intestines. When this is observed, cupping or the application of leeches should always be resorted to, in addition to the other means already noticed. The pain and uneasiness produced in the duodenum, in consequence of the inordinate flow of an irritating bile into this viscus, is, owing to the situation of the parts, often mistaken for pain and inflammation of the liver itself. This is, however, a matter of subordinate consequence in a curative point of view; for the treatment suitable in the one case is by no means inappropriate in the other. In a diagnostic point of view, it is otherwise; and yet, in a warm climate more particularly, it is almost impossible to distinguish between the one and the other. It is true, the expe-

rienced observer may often, from a concurrence of circumstances, draw a very correct idea in his own mind of the exact form of disorder. But if he attempt in this, as in many other cases, to convey a notion of the grounds on which he has usually founded his opinion, and to describe the symptoms by which he has been assisted in his diagnosis, he will as often mislead as instruct his reader:—it is obvious that close and attentive observation of this condition can only be acquired at the bed-side of the patient.

Sect. III.—*On Congestion of Bile in the Gall-Bladder or Biliary Ducts.*

This is one of the most important derangements of function to which the biliary apparatus is liable in a warm climate. It may appear as the only cause of disorder, or it may be complicated with other derangements, if not actually producing them. As respects its origin and progress, it seems to be very intimately connected with an increased secretion of bile: indeed, such increase, to a greater or less extent, is materially necessary to its occurrence.

During my practice in India, I have had numerous opportunities of observing, in the *post mortem* inspection of those who had died of diseases either immediately seated in the liver, or affecting other organs, the gall-bladder distended with a thick, viscid, and acrid bile, and the ducts running from the secreting granulæ of the liver through its substance to their principal trunk, completely gorged with bile of nearly similar characters. In different cases, indeed, this secretion presented different appearances, as regards colour and consistence; but the engorgement of the ducts and gall-bladder was generally remarkable, without any apparent organic change sufficient to account for the circumstance. In the majority of instances, the outlet of the ducts in the duodenum was quite free, and their channels unobstructed, unless the viscidity of the secretion may be viewed as an impediment. Where any obstacle existed, such as narrowing of the ducts, the impaction of calculi in them, or the existence of spasm,—the cause was then evident; but in the absence of all these, the only conclusion I could form as to the cause of this very frequent appearance, was, that the secreting functions of the liver may be so modified in a warm climate, that, in addition to an increase of the biliary secretion, this fluid itself may be retained and accumulated in those parts of the apparatus which admit of the retention. Attentive observation of the phenomena, marking the origin and progress of the diseases of the liver and bowels, and of the various types of fever, convinced me that

this state of function actually obtains, at the commencement and during the progress of these disorders, more frequently than is supposed, and is actually oftener present at these periods of ailment than in the last or fatal stage of disease; and that it is not only met with as a symptom or concurrent phenomenon in these disorders, but as an ailment *sui generis*, the disturbance observed in the system being the result of this cause, or arising from the irruption of the long-retained bile into the alimentary canal.

During an increased secretion of bile, if any momentary impediment come in the way of the flow of this fluid, either in the course of the common duct, or at its outlet, a copious regurgitation of it into the gall-bladder, and accumulation of it in the biliary ducts, must be the consequence. If the secretion be going forward abundantly, an obstacle, partial in its operation and of short continuance, will give rise to a great accumulation in the gall-bladder, and in the liver itself. If the secretion be natural, or even less than natural, a more complete or long-continued impediment opposing its discharge into the duodenum will have a similar effect. Thus, in recruits and other strangers to the climate, on their arrival in India, when the biliary secretion is much increased, the temporary obstruction produced by exposure to currents of cool air, to wet, and by eating indigestible and hurtful substances, &c. often occasion the most formidable symptoms of disease, and when the obstruction is overcome, an immense quantity of vitiated bile is passed. On the other hand, temperate persons, of regular habits and good conduct, are not so liable to this kind of derangement. It is also reasonable to suppose, if the gall-bladder and ducts be over-distended with the accumulation of bile within them, that their vital contractility may be weakened, and that they will be the less able to re-act upon the distending power; and thus the evil will be increased, until that degree of constitutional disturbance be excited by the morbid distension, or until some internal or external cause supervene, which shall enable the organ to throw off the load which oppresses it, and discharge its morbid secretions.

The obstructions which generally occasion accumulation of bile in the apparatus concerned in its secretion and discharge, seem to be whatever suddenly diminishes the vital influence of the organ or the system generally; as exposure to terrestrial and morbid exhalations, sudden chills, the depressing passions, the use of cold fluids and ices when the skin is perspiring, &c. Spasm of the common ducts may arise from these and other causes, and produce more completely the same effect. A weakened state of the

digestive organs, particularly of the duodenum and stomach, may also be productive of accumulation of bile, by furnishing a copious supply of ill-digested chyle, abounding with the elements whence bile is formed; while, at the same time, the debility which these viscera experience extends itself to the gall-ducts and bladder; and the emulgent operation, usually produced by a healthy and active function of the duodenum no longer takes place, or, if at all, in a lesser degree. The accumulation of mucus on the internal surface of the duodenum may also obstruct the mouth of the common duct, and prevent the flow of bile into the alimentary canal, until this obstruction be either overcome or removed.*

With respect to the signs by which accumulations of bile in the gall-bladder or biliary ducts are to be recognised, it may be observed, that, although they may be depended upon on many occasions, they are not always uniform; nor, taken singly, can much reliance be placed upon them. However, when viewed in connexion, they may be considered as conclusive as the signs which mark any other functional disorder: nice discrimination, however, is necessary to the discovery of these more obscure biliary derangements. Many of the symptoms by which they are indicated are not generally of such apparent urgency as to alarm the patient, and cause him to apply for medical aid, until further disorder be produced, or until the accumulated bile has made its way into the duodenum, and, from its irritating qualities, caused disorder of the alimentary canal, and serious constitutional commotion. The earliest symptoms of which the patient generally complains, when he attends to his sensations and state of health, are, clamminess and foulness of the mouth, fauces, and tongue, with a bitter taste, particularly in the morning; a sense of distension and weight at the epigastric region and at the præcordia, frequently with a sense of coldness and sinking in the same situations; slight anxiety; acid and acrid eructations about three or four hours after a full meal, with painful fulness at the epigastrium, and difficult digestion. The patient often complains of headach, pain in the back or loins, uneasiness under the shoulder-blades, fulness and pain in the region of the liver, particularly when pressure is made at the time of his taking a full inspiration; and of aching in his knees, shoulders, and limbs; his countenance being pale, sallow, or muddy, and the conjunctivæ more or less tinged of a yellowish hue. The state of the pulse varies in different cases. It is often slow and full, and

* See my "Sketches of the Diseases of India," &c. p. 392, *et seq.*

sometimes it is irregular in frequency and strength; occasionally it intermits, and not unfrequently becomes quick, but oppressed upon the least motion or exertion. The urine is generally high coloured, and depositing a brownish sediment. The stools are often costive, sometimes light or clay-coloured, and frequently tenacious. When the accumulated bile is discharged into the alimentary canal, much constitutional disturbance then generally arises, according to the qualities which this fluid may have acquired from its retention. The pulse now becomes quick, and often irregular; vomiting and purging, with griping, pain, and anxiety, supervene, sometimes with spasms. Thirst becomes urgent, and the tongue, which was before foul, is now white and dry, and its papillæ large, distinct, and erect.

When only two or three of the above symptoms are present, or when they are slight, the patient seldom seeks relief until an aggravation takes place, or until the pent-up bile creates more alarming disturbance from its irruption and sudden flow into the duodenum. On such occasions, the constitutional irritation is often violent, owing to the mucous connexions of the duodenum with the other parts of the animal economy. The particular effects produced by the bile, when thus let loose upon the sensible mucous surface, will vary, according to the properties which it may have possessed originally, or may have acquired during its remora in the gall-bladder and ducts; and according to the habit, strength, age, and temperament of the patient, and the condition of the mucous surface of the alimentary canal at the time. As these circumstances, and the relations of one to the other, vary, so will the particular kind of disorder differ in character: it may assume the form of simple bilious diarrhœa, terminating in a few hours, or running on for several days; it may be bilious or sporadic cholera; it may even occasion simple dysentery, or inflammation of the mucous surfaces over which the disordered secretion passes, or upon which it is for a time retained. On many occasions it will produce vomiting, and on others inflammatory action of the internal surface of the stomach. But in this latter case there will also be more or less of the same action produced by it in the duodenum and inferior portions of the alimentary canal. Sometimes the inflammation will be confined to the duodenum itself; but this is a comparatively rare occurrence. A case of this kind was verified by the appearances on dissection:—

A female, leading an irregular life, came into hospital complaining of all the symptoms of bilious accumulation of a morbid

character, with much debility, a broken-down constitution, quick, feeble, and fluttering pulse, nausea, and vomiting of dark-green bilious matters, slight purging of dark bilious and fluid motions, coldness of the surface, sunken countenance, and pain and anxiety at the pit of the stomach and right side. She died soon after admission, and the body was inspected within twelve hours after death. Upon examining the alimentary canal from the œsophagus to the rectum, and exposing its internal surface throughout, the duodenum was found highly inflamed from the pylorus to the jejunum, the upper portion of which latter was also inflamed. A part of the duodenum, a little below the entrance of the ducts, was sphacelated. A few red points were observed in the stomach and other parts of the alimentary canal; but these were not more numerous or extensive than what are often remarked in cases of death from diseases in which the functions of the alimentary canal were unaffected. The portal veins were turgid; the liver somewhat enlarged. There was no other morbid appearance.

It sometimes occurs that the inordinate flow of morbid bile into the duodenum, particularly when it has been long retained, and during close, warm, and moist states of the air, occasions great faintness, the most alarming state of sinking, and prostration of the vital energies. This is more particularly marked in the nervous and melancholic temperaments, and debilitated habits. On the other hand, when the secretion possesses irritating qualities, and when it passes into the digestive canal in too great abundance, in individuals endowed with the sanguine and irritable temperaments, and full or robust constitution, much febrile excitement frequently follows, particularly if the mucous surface of the duodenum and small intestines be less than usually protected by its secretions.

In those cases where the natural functions of the bowels have been impeded by accumulations of viscid and tenacious matter adhering to them, the irruption of morbid bile is productive of much less violent constitutional disturbance, and is even beneficial, inasmuch as it detaches this matter from the mucous surface, and leaves it free and unencumbered in the performance of its functions. It should, however, be remembered, that the impeded flow of bile which often precedes and accompanies the congestion of it in the gall-bladder and ducts, is often the cause of an inordinate accumulation of mucus on the internal surface of the bowels, the discharge of bile being insufficient, under these circumstances, to produce the necessary effects upon the mucus, and to detach it from the surfaces to which it so firmly adheres.

Besides occurring as a primary disorder, accumulation of bile is often met with in intertropical practice, as a symptom of other more dangerous and severe diseases. As it thus occurs, it will be noticed under its appropriate head; and the complications of diseases, of which it occasionally forms a part, will also be brought under consideration in the sequel.

SECT. IV.—*On Congestion of Blood in the Liver.*

Congestion of blood in the liver is a more frequent occurrence, both in warm and temperate climates, than generally supposed. It is present in the early stage of the majority of febrile diseases, particularly in those which are idiopathic, and is not usually overcome until after the stage of excitement has been fully formed. Congestion, existing under such circumstances, forms but a part of the general disorder of function induced by the efficient causes of fever. When thus occurring as a symptom of fevers, it will receive attention, when these diseases come under consideration. As I conceive it, however, to form a primary disorder, and to lead to the production of other diseases, I shall at this place direct that attention to it which its importance seems to require.

That congestion of the liver should occur frequently cannot be a matter of surprise, after what has already been advanced respecting the disorders of the stomach, and the derangements which the secreting functions of the liver experience in those who migrate from a cold or temperate climate to that of India. The increased secretion of bile, and the frequent accumulations of it in the ducts and gall-bladder, of themselves often necessarily lead to a greater or less determination of blood to the substance of the secreting viscus. Increased secretion creates a demand for an augmented supply of blood for the purpose of secretion; hence an active determination of this fluid to the viscus whose functions are thus excited, is a necessary consequence. Accumulations of bile in the liver itself, or in its receptacle, occasion alterations in the qualities of this fluid; and the properties it acquires, when detained for a considerable time in a high temperature, occasion a debilitating impression on the portal vessels, disposing them to congestion and passive accumulations of venous blood, which continue until circumstances supervene, either internally or externally, calculated to impart to them a power of reaction on the mass of blood, by which they are over-distended.

Whatever, directly or indirectly, diminishes the vital energy of the liver itself, or the organs more intimately related to it in function or by anatomical connexion, necessarily impairs the tonicity of the portal veins, and favours congestion in them. That they are more generally the seat of such congestion, may be inferred from the circumstance of their being placed beyond the direct current of the general circulation, and of their forming a smaller circulating system of themselves, depending entirely upon their own vitality and that of the liver for the due performance of their circulating function. Another circumstance, which also confirms this view, is, that the hepatic vein is less capacious than the vena portæ and hepatic artery, whose blood it returns. This, however, can scarcely be expected to be productive of congestion of the portal veins under ordinary circumstances, when the vitality of the viscus is perfect in every respect, and the function of secretion proceeds in a healthy manner. But when this function is impeded, and when accumulations of bile take place in the ducts, either owing to a viscidity of the fluid, or obstacles placed in its way, the whole of the blood circulating in the vena portæ and hepatic artery returns, undiminished by the secreting function, into the hepatic vein; and thus congestion of the portal vessels ensues, in consequence of the passage of the blood into vessels of diminished capacity. The ingestion of large quantities of food and fluids is apt still further to promote this state, inasmuch as a part of these materials finds its way directly into the vessels which pour their contents into the portal vein. And although such supply of new materials may not materially affect the functions of the robust individual who promotes the circulating and secreting functions of the liver by means of regular and sufficient exercise; yet it must injure the action of the organ, and load its vessels, in the weak, the dyspeptic, and the predisposed to affections of the biliary organs, and tend to the production of an increased and morbid secretion of bile, as well as to accumulations of it in the gall-bladder and ducts. The viscidity and highly venous properties of the blood circulating in the portal system likewise tend to the production of congestion, particularly when these states are but little diminished by secretion; and hence we find, that when the secreting function of the liver is impeded, or when the discharge of the bile into the duodenum is in any way obstructed, congestion is superinduced.

Too great importance cannot be attached to this condition of the vessels of the liver by the intertropical practitioner, inasmuch as it

is present in the early stages of a great many diseases,—also that it originates others, when neglected or improperly treated,—and that it supervenes upon, or accompanies some, during their increase or decline. Congestion of the liver is present at the commencement of all the forms and types of fever met with in warm climates; it very often gives rise to inflammation of the liver itself; congestion, various in degree, and differing as respects activity and passiveness, often terminates in inflammation of the substance of the liver or its surfaces. If the inflammation induced from this cause be seated in the surface of the liver, it assumes more generally an acute and decided character;—if it originates in the substance of the organ, it more frequently puts on a chronic form, and not unfrequently terminates in abscess, before any marked symptoms enable us to decide respecting the existence of inflammatory action. It must, however, be observed, that, although increased secretion of bile, and still more frequently accumulations and retentions of this fluid upon the organs engaged in its formation and discharge, often give rise to congestion of blood in the liver,—the existence of this latter condition will, in its turn, be often productive of the former disorders of function. The state of the blood, when congested in the portal veins, is often such as favours the increased secretion of bile, particularly when the congestion is of an active kind, and unconnected with an obstructed or an impeded return of the blood through the hepatic veins, and when the functions of digestion are not materially impaired. When the congestion is of a passive kind, owing to the diminished tonicity of the vessels of the liver, accumulations of bile in the hepatic ducts is often a concomitant lesion, both derangements depending upon a similar cause, namely, impaired energy of the organ. Sometimes the accumulation of bile seems to be the effect of the venous congestion; at other times venous congestion appears to originate in the accumulated bile and the obstructions in the way of its discharge; whilst, again, the co-existence of both these states seems to result, as just mentioned, from one chief cause.

Congestion of blood in the liver exists during the progress and decline of other diseases. This is particularly remarkable in the history of the dysenteries of India, and in the remittents, intermittents, and continued fevers of that country, and of other intertropical regions. Even in the dissection of those cases which terminate fatally, whether from fever or whatever type, from dysentery, from cholera, either simple or epidemic, or from dis-

orders of the other abdominal viscera, and even in those more particularly affecting the head or chest, great congestion of the vessels of the liver is not unfrequently observed.

With respect to the particular anatomical characters and appearances which congestions of blood in the liver furnish, it may be said, that the viscus is usually much increased in size, particularly the right lobe, and that the increase in bulk takes place chiefly in the direction of the thoracic cavity, the right lobe of the liver generally rising up into the chest, and forming a large segment of a circle. The colour of the organ is generally changed by the congested state, and often varies considerably. This difference of colour in different cases, and even in the same, seems to depend upon the particular set of vessels, which is the seat of congestion, and to the absence or co-existence of congestion or accumulations of bile in the ramifications of the hepatic ducts. In some cases, the surface of the liver is of a darker brown than natural, almost amounting to black, greenish-black, or bottle-green, and this deep colour in some instances passes very abruptly into a reddish or light-brown tinge.* Sometimes the surface of the congested liver is variously mottled, or marbled, or it is streaked and clouded, of a yellowish-brown, greenish-black, or yellowish-green hue. These shades of colour are generally more remarkable upon its upper or convex surface, but they are often observed upon the concave surface, and are quite independent of any effects which may have been produced by the bile contained in the gall-bladder. Sometimes the surface of the liver is very dark; yet, upon cutting into its substance, the subjacent texture is of its usual colour.

When cut into, the substance of the liver is, however, generally darker than usual, and gives out a large quantity of dark fluid blood: but in regard to fluidity, there is much difference, according to the period which has elapsed from the time of death to that of inspection. In India, where the *inspectio cadaveris* is usually made a few hours after death, the blood is observed, in cases presenting congestion of the liver, of a fluid or semi-fluid, or thick consistence, and of a very dark colour. The portal vessels and the hepatic veins are the seats of congestion, and it is often difficult to say which of the two sets of vessels presents this appearance to the greater extent, or more frequently; but I believe that the hepatic vein is more generally congested in the greater degree. In many

* These are faithfully represented in the Plates which accompany the 4to edition of this work.

cases, the congestion of the blood-vessels and accumulations of bile in the biliary ducts, although existing to a great extent, are insufficient to account for the very great increase of the size and weight of the liver, showing that these appearances are often connected with the augmented size of the viscus, independently of the extent to which they could have increased its bulk, and of any organic disease. On some occasions, congestion and accumulation of bile have been considerable, without any very marked augmentation of size; but more generally, congestion of the blood-vessels, particularly when associated with accumulations of bile in the biliary ducts and gall-bladder, gives rise to increased size of the liver; and such increase is often in relation to the extent to which congestion of the blood-vessels and biliary ducts obtains.

With regard to the appearances of the bile lodged in the biliary ducts, they are very various. Sometimes the bile is pale, and it is observed in different subjects deepening in shade from a straw colour to an orange, and varying from a yellowish green to a greenish black or deep bottle green. When observed of the lighter shades of colour, it is generally most fluid; the darker tinges being most frequently associated with considerable consistence and viscidity of the secretion, and turgescence of the ducts. Upon making sections of the congested liver, the divided mouths of the distended ducts appear rounded or oval, according to the direction in which the division is made with respect to the axis of the duct, and in some cases, small granular or miliary calculi are found in the ducts. In cases presenting the most fully marked appearances of congestion and biliary turgescence of the organ, the viscidity of the bile, and the infarction of it in the gall-ducts, seem to have given rise to the formation of those small calculi in the substance of the liver, and to the venous congestion with which these appearances were associated.

The bile found in the gall-bladder, in cases where congestion of the blood-vessels and turgescence of bile in the liver have been well marked, has generally been of a green colour, of every degree of shade, from a light green to a greenish black; and of every degree of consistence, from a healthy state of fluidity to a gelatinous consistence and great viscidity. The darker and more consistent appearances of this secretion, although often connected with spasmodic or more permanent obstructions in the cystic or common ducts, have been often remarked without any such cause; its own viscidity and consistence being the only impediment to its discharge into the duodenum.

Besides the simple appearances of disorder now described, it should be observed, that congestion of the blood-vessels and accumulations of bile in the biliary ducts and gall-bladder often accompany, or are consequent upon, inflammations of the liver, and abscesses in its substance, as well as other organic changes.

The symptoms marking congestion of the liver, particularly of the portal veins, are not such as can individually be depended upon. They must be viewed in connexion, and the relations and sources of each should be duly weighed before we decide upon the actual presence of a particular state of the vessels. When, however, the countenance is pale, anxious, sallow, of a dark or muddy hue; when the tongue is covered with whitish or yellowish-white fur, or otherwise loaded; when the bowels are costive, or when the stools are morbid, dark, and watery, with griping and tenesmus; when the digestion is difficult, attended with nausea, or when the appetite is diminished, and the patient complains of pain and oppression at the scrobiculus cordis, particularly after a meal, with flatulence, and oppressed breathing, and a difficulty of filling the lungs to their utmost; when the skin is cool, and clammy, or of a dark muddy tinge, with irregular chills, sometimes approaching to rigors; when pain, fulness, weight, and oppression, are experienced in the region of the liver, and at the epigastrium, or across the shoulder-blades, or beneath the scapula, and have supervened suddenly; when the uneasiness in those situations is increased upon a full pressure and full inspiration; when the pulse is full, slow, and irregular, or when it is quick, but oppressed; when there is headach, restlessness, disturbed sleep, with unpleasant dreams; and when the urine is turbid,—we may infer that congestion of the vessels of the liver is actually present. It should, however, be recollected, that all, or even the greater part of these symptoms, are not present in every case; but many of them may be recognised in different grades: and it is as much by the absence of the symptoms characterising the existence of other and more serious disorders of the liver and adjoining viscera, viewed in connexion with those signs, that we judge of the actual presence of congestion, as from absolute value of the individual symptoms now enumerated. During congestion, the state of the pulse is very variable; its frequency depending as much upon the habit of body and temperament of the patient, as upon the particular state of the circulation of the liver which obtains at the time. If there have been vomiting (an occurrence by no means unfrequent in this state of the organ) previously to our examining the pulse, we shall often find it quick, soft, and even

full; but a quick state of the pulse accompanying the symptoms above enumerated should always lead us to dread the supervention of either general fever or of inflammation,—if, indeed, the latter state does not actually exist at the time.

With respect to pain, oppression, weight, and aching about the region of the liver, the epigastrium, and under the shoulder-blades, although also characterising inflammation of the substance of the liver, they as frequently mark congestion of the organ, particularly when they supervene suddenly, and are attended with many of the symptoms already mentioned. Inflammation does not arise and advance to its acmé at once, or even in a few hours; but congestion may supervene in a very short time, and, after but a brief duration, terminate in the inflammatory state. Nor can I consider the circumstance of the painful and uneasy sensations now alluded to as necessarily the result of inflammation, because they are somewhat increased by firm pressure and a full inspiration, although I should suspect this state, and act accordingly. During congestion, the liver is tumefied, its surface put upon the stretch, and pain is thereby produced in its coverings and substance: the diaphragm is also pressed by it against the right lobe of the lungs upon the one side, and the stomach and the duodenum on the other; hence the oppression and difficulty of breathing, and the fulness and sense of distension and weight, after a meal more particularly. When the congestion is complicated with accumulations of bile in the ducts and gall-bladder, these sensations often become very urgent, as much so, indeed, as active inflammation of the organ. If the congestion be attended with increased secretion of bile, such increase not unfrequently relieves the congested condition of the vessels, in the same manner that a moderate flow of milk relieves the congested state of the vessels of the breast, which frequently supervenes, and which, if not overcome, either in this manner or in some other, often terminates in inflammation, and the formation of abscess.

Sect. V.—*On Torpor of the Biliary Organs.*

It was remarked by the late Dr. Good, that feeble children who secrete little bile may have the biliary ducts clogged up with mucus; and from an atony of the absorbents of the viscus, the liver may thus become enlarged. I believe that such is also frequently the case, in warm climates, in adults as well as in children. But the atony of the viscus seems to be general, as respects the functions of the different vessels and nerves with which

the organ is supplied. When the vital energy of the hepatic apparatus is exhausted, in consequence of dissipation, drunkenness, and other causes, the bile which is formed is either diminished in quantity or of a depraved quality, and sometimes it is both. In scrofulous habits the extreme ramifications of the hepatic ducts are liable to accumulations of mucus in their channels, which obstruct the flow through them of whatever bile is secreted; and thus the granular structure of the organ becomes infarcted with bile and mucus, until the organ acquires, in some cases, a scirrhous enlargement, and in others, until partial attacks of chronic inflammation supervene to the state of obstruction, and give rise either to the disposition of new matter, in the form of coagulable lymph, or to the formation of small and numerous abscesses in the substance of the viscus. The obstructions thus placed in the way of the due secretion and circulation of the bile through the biliary ducts, in process of time occasion partial congestion of blood in the ramifications of the portal vein; for the venous blood circulating in this important vessel being undiminished and insufficiently changed by the secreting process, is more likely to become retarded in the course of its return through the small vessels forming the terminations of the portal vein and the radicles of the hepatic vein; and thus congestion, necessarily, will slowly supervene to the state of torpid function, and will affect the substance of the organ partially in some cases, and more generally in others, according to the extent of disordered function in which it originates. In many cases of congestion, this state of the vessels supervenes without any appearance of the previous existence of deficient or torpid function of the organ. It seems to proceed, in such cases, from causes which, either directly or indirectly, determine an accumulation of blood in the vessels, at a time when the secreting actions are not very manifestly or seriously disturbed previously to the supervention of the congested state. An atonic or weakened state of the congested vessels, or some other state of predisposition, no doubt, obtains about the time that this particular disorder supervenes; but such states amount not to disease, nor occasion any very marked derangement of the secretion, previously to the supervention of congestion. When, however, torpid function is present, and more particularly when it has been of any considerable duration, venous congestion of the vessels of the liver should always be dreaded, and its existence, as far as it may be ascertained, should be carefully inquired into. Congestion, thus supervening to torpor of the secreting energy of the organ, and retarded circulation in its vessels, tends to

perpetuate both these conditions, and to increase the disease; until enlargement of the organ, chronic inflammatory action of the vessels in its substance, or even acute attacks of inflammation, supervene, according to the temperament and habit of the individual, and the causes of disorder to which he is subjected, giving rise to organic changes of the most formidable nature.

Torpor of the liver, then, may arise simply from a diminished or an exhausted energy of the secreting functions of the organ; and, from this state, complicated with accumulations of bile in the biliary ducts and gall-bladder, and with congestion in the blood-vessels of the organ; the former state of disorder gradually superinducing, and becoming complicated with, the latter derangements. Torpor of the liver is generally complicated with dyspepsia, and not unfrequently originates in that disorder, particularly in protracted cases. Habitual over-excitement of the stomach and liver, from eating much animal food and highly-spiced dishes, and from the inordinate use of spirituous and vinous liquors, often induces a torpid condition of the secreting functions of the liver, particularly when the habitual causes of the over excitement are withdrawn suddenly, and entirely cease to act. The weakened state of the duodenum and small and large intestines, or inactivity of these viscera, frequently extends itself to, or is complicated with, torpdity of the functions of the liver. For in cases where, from the weakened actions of the duodenum and inferior portions of the alimentary canal, their internal surface soon becomes covered by a coating of thick and tenacious mucus, so that the ingesta and secretions poured into them cannot come in contact with their mucous coat in such a manner as to excite them to healthy and active operation; and hence the emulgent effect usually produced upon the mouths of the ducts from continuity of surface and consent of action, is very inefficiently performed, if at all; and thus a similar state of function to that existing in the alimentary canal is extended to the liver. Habitual inattention to the due and daily discharge of the bowels is also one of the chief causes of disorder operating upon the biliary secretions, through the medium of the digestive organs.

Over-excitement, also, of the perspiratory functions, from long-continued marches, fatiguing exercises, and too warm clothing, is often productive of considerable exhaustion of the secreting actions of the liver, and disposes it to torpor, venous congestion, and accumulations of bile in the biliary ducts, upon the slightest exposure to cold, to moisture, to the impression of malaria, and when the

depressing passions are brought into operation, or when hurtful or indigestible matters are taken into the stomach.

In addition to these causes, the habitual use of too much animal food should be enumerated, inasmuch as this species of diet furnishes very abundant materials for the liver to operate upon, and thus exhausts the energy of its functions. It also tends more than any other cause to the production of a too abundant secretion of bile, to accumulations of bile in the gall-bladder and ducts, and to venous congestions of the liver; and it indirectly produces torpor of the vessels from congestion and engorgement. Of all the causes, however, which combine to produce torpidity of the liver, there are none of more general or more potent operation than the neglect of exercise. Indolence and full living is productive of torpid function of the liver in all climates; and in warm climates not only does this particular state of the organ supervene as a necessary effect of this cause, but it is also accompanied with congestion of blood in the veins of the organ, and with accumulations of bile in the biliary conduits and receptacle. Next in importance to this cause is a neglected state of the bowels. Such neglect is very frequently observed in soldiers, and, indeed, in all ranks of life, and is hurtful by allowing viscid and tenacious mucus to form upon the internal surface of the alimentary canal, impeding its functions, sheathing the mucous coat from the requisite influence of the ingesta passing along it, and of the secretions poured into it from the liver and pancreas, and even obstructing the mouths of the ducts of these viscera, and shielding them from the healthy and natural stimulus which the chyme affords to the ducts, and, through them, to the viscera themselves.

Having thus stated what appears to be the chief causes of torpid function of the liver, as well as the pathological states to which these causes lead,—namely, a diminished and, perhaps, a vitiated secretion of bile, together with a retarded flow and discharge of that which is secreted, giving rise to its viscidity, to obstructions of the biliary ducts, and to congestion of the portal vessels, I now proceed to notice some of the more prominent symptoms by which this species of functional disorder may be recognised.

Torpor of the functions of the liver is a condition which cannot always be detected with precision, even after the most careful examination. If, however, we find the patient to complain of want of appetite, drowsiness, with pain over the eyebrows, lowness of spirits, and hypochondriacal feelings, dark and high-coloured urine, a costive state of the bowels, and pale or clayey motions, a dark or

sallow countenance, wasting of the flesh, slow and painful digestion, with the symptoms noticed in a previous section as constituting diminished function of the stomach, flatulency, particularly of the bowels, without any evident fulness or enlargement in the region of the liver, but with a bitter or disagreeable taste of the mouth, and a loaded state of the tongue, particularly in the morning,—we may reasonably infer that the functions of the liver are inadequately performed; but it is by no means so easily to be determined whether such torpor is the result merely of diminished function, or of change of the structure of the organ, unless we are acquainted with the patient's habits and the nature of his former ailments. When the foregoing symptoms occur in one addicted to the use of spirituous liquors, or in one who has resided long in a warm climate, and suffered former attacks of hepatic disease, then the latter condition may be reasonably inferred.

When the foregoing symptoms are conjoined with those already noticed as marking the existence of accumulations of bile and congestions of the blood-vessels of the organ, it may be inferred that torpor is associated with these particular derangements. Torpor of the liver frequently supervenes to attacks of acute inflammation of the organ, and is very often associated with, and consequent upon, repeated attacks of ague, even when no organic change of the viscus is present.

SECT. VI.—*On the Treatment of Functional Disorders of the Liver.*

In all cases where it is found upon investigating carefully into the symptoms and the habits of the patient, and the state of the viscera themselves, as far as a manual examination may satisfy us, that the usual signs of increased secretion or accumulation of bile, or congestion of the blood, depend upon too full living, or upon increased determination of blood to the abdominal viscera,—general blood-letting should be resorted to, especially in the plethoric, and in those of a sanguine temperament, and still more particularly if they have recently arrived in a warm climate. Local depletions, by means of leeches, will be found of advantage in the less robust and older residenters, and in those cases where general blood-letting may not be advisable, or after it has been once performed. In such cases, the object is not so much to subdue the disorder actually existing, as to prevent the supervention of inflammation in the liver itself, or in those parts of the alimentary canal with

which the morbid secretion comes in contact. The other parts of the treatment, with few exceptions, should also be strictly antiphlogistic. Aperients, or purgatives, are also requisite, according to the state of the bowels, in order to carry off the morbid secretions, and to prevent the supervention of more serious disorder, from their retention upon sensible parts. When, in consequence of the sudden irruption of acrid bile into the duodenum, after having been for some time retained in the biliary organs, much commotion is produced in the system, with frequent purging and vomiting,—the use of copious draughts of very warm water, is essentially beneficial. Warm fluids dilute the bile, and diminish its acrid properties, while they promote its expulsion from the alimentary canal. When, therefore, vomiting supervenes, it may be encouraged by these means; and if retching, nausea, and a bitter taste of the mouth, be complained of, and no symptom of active inflammation of the liver be present, an ipecacuanha emetic will be of advantage, particularly if its effects be fully promoted by the liberal use of warm fluids. After vomiting has been duly performed, the bile, and other secretions which are poured into the bowels, should be removed by the operation of a full dose of calomel; and where there is much symptomatic fever, occasioned by the flow of morbid bile, by calomel, with James's powder, which, in a few hours, may be followed by the mist. amar. cum sennâ, by a dose of jalap and supertartrate of potash, or by a weak solution of salts. If the passage of the acrid bile into the stomach and bowels occasion inflammatory irritation of their mucous surface, leeches should be applied, and, if requisite, be followed with a blister on the abdomen. When the biliary secretion is obviously of a morbid kind, notwithstanding the repeated use of purgatives and other evacuants, then calomel, or some other mercurial preparation, should be given in full doses at bed-time, with a view of changing the secretion of the liver, and effecting a healthy flow of bile, and be followed by an aperient draught in the morning, in order to carry off the secretions and fæcal materials which may have accumulated during the night, and which, if allowed to remain in the cells of the colon, may be productive of disorder and inflammatory irritation of the mucous coat of the bowel. If the mouth should become affected under this treatment,—which frequently happens when it has been preceded by depletions,—a healthy state of function of the liver is the more likely to supervene, speedily; but to affect the mouth should not be our object, for reasons already stated in my "Sketches of the Diseases of India." *

* See p. 392, *et seq.*

I have often observed that the sudden flow of morbid bile into the duodenum has been productive, in some habits and constitutions, and in the weak and debiliated particularly, of much disorder, attended with a sense of syncope, great coldness of the surface, frequent retchings, and irregularity of the functions of the heart. In such cases, draughts composed of the sp. ammon. arom. with the sp. æther. nitr. or medicines of a similar nature, in some camphor mixture or aromatic water, until the more urgent symptoms were subdued, have proved most serviceable. To these medicines may be added some of the tinct. opii, in doses according to the particular circumstances of the cases, for which it is prescribed. When the more violent symptoms are removed, the expulsion of the cause of disorder is the object to be kept in view; and it is generally effected by the more gentle means which aperients, combined with antispasmodics and diluents afford. In many cases of this description, the application of very hot fomentations to the epigastric region, and the injection of an emollient and anodyne enema, have proved very beneficial; but after the more urgent symptoms are overcome in these cases, care should be taken not to allow the morbid secretions—the cause of disorder—to accumulate in the alimentary canal. With a view to their expulsion, and to the obtaining a healthy state of the hepatic functions, full doses of calomel should be given at bed-time, and be followed by an aperient draught in the morning, until the motions assume a healthy character, and until the tongue and mouth of the patient are of a natural appearance, and the pulse and general aspect assume their usual state.

It will, however, sometimes happen, that mild purgatives, or even strong cathartics, will not act sufficiently in such cases. When this is observed, they should be assisted by injections, and the exhibition of the purgatives by the mouth persisted in. A large dose of calomel, followed by castor oil, or by the common black draught rendered more active by the addition of a bitter, and a little tincture of jalap, has always answered the purpose when assisted by a purgative enema, or when repeated as circumstances required. When the disorder is increased by the retention of morbid accumulations in the bowels, the frequent and regular action of tonic laxatives is indispensable as long as the stools continue morbid, and should not be laid aside from a fear of debility. The operation of aperients should be judged of by their effects and the state of the motions, and not by the quantity taken, or the frequency of their exhibition. When, however, there

are symptoms of inflammatory action of the mucous surface of the bowels present, we should be extremely cautious in the exhibition of purgatives, and should assiduously endeavour to discriminate between the disordered state of bowels proceeding from inflammatory action, and that arising from the retention of disordered secretions or other matters.

In those cases where the determination of blood to the substance of the liver and adjoining viscera seems to be considerable, and where the congestion of the blood-vessels and engorged state of the biliary ducts and gall-bladder create much disturbance and febrile commotion of the system, either from the undue retention of the bile in these situations, or from its sudden discharge into the alimentary canal, in addition to the depletory and antiphlogistic means already adduced, saline mixtures, with the liq. ammon. acet. or the carbonates of the fixed alkalies and lime-juice, or the citric acid, may be given through the day, calomel being exhibited at night, and an aperient draught early the following morning. In many cases the liq. antim. tart. may be given with advantage in conjunction with the saline mixture, in order to determine their effects more fully to the skin, particularly if symptomatic fever is present; and in other instances, the sp. æther. nitr. will be prescribed with advantage.

Where we have evidence of an increased secretion of bile being the result of general febrile commotion, with active determination of blood to the liver, as in cases of inflammatory bilious fever, or bilious remittent fever, vascular depletion, is requisite. But we often observe in warm countries, evidence of an increased flow of blood to the liver occasioning a copious formation of bile; and this sometimes of a morbid character, without any febrile condition of the system, but with every appearance of tolerable health, and with a perfectly unimpaired appetite. Indeed, the appetite is even more than usually good, and the patient more than prudently disposed to indulge in it. There is also present much thirst, and an irregular state of the bowels. The best mode of treatment is to abridge the diet of the patient; to reduce his quantity of animal food and daily allotment of wine; and to give cooling aperients in order to keep up a gentle action on the bowels. Where the increased determination of blood to the liver, resulting either from too rich or too stimulating food, or from great heat or other circumstances of the climate, gives rise, in addition to the disorder of the biliary secretion, to fulness in the situation of the viscus, or in the epigastric region, or to pain or uneasiness even in the least degree, blood-

letting, either general or local, ought to be instituted with promptitude and decision, until all symptoms of uneasy feeling disappear, and the biliary secretion be reduced in quantity, or improved in quality. The other antiphlogistic measures usually adopted should also be put in practice, in order to arrest the existing disorder, which may be converted in a few hours into active inflammation and commencing abscess.

In all cases of increased or morbid secretion of bile, or this state conjoined with accumulations of it in the biliary organs, or with copious irruptions of the secretions into the alimentary canal, not only the treatment should be evacuant and depletory, but the diet and regimen ought also to be of a similar kind. The patient suffering a severe attack of any of the above disorders should abstain from animal food and highly-seasoned dishes, and restrict himself chiefly to vegetable and farinaceous diet. In the less severe attacks, small quantities of weak soups, or of fish, or of white-fleshed animal meat, may be taken occasionally; and cooling diluents, as the imperial drink, lemonade, or water made agreeable by the addition of a few drops of nitric acid, or of the nitro-muriatic acid, should be adopted, until the functions of the liver and digestive organs assume their natural state.

With respect to the treatment of *vascular congestion* of the liver, but little need be advanced beyond what has now been stated. Where the symptoms of congestion of this viscus are decided, and when it may be therefore considered that the vascular turgescence is great, active general, or local depletion, or both, ought to be put in practice; and the practitioner should not be deterred from the operation by the state of the pulse in such cases: for although often slow, weak, or oppressed, it generally rises upon the free flow of the blood, owing to the removal of the load which weighed down the vital power of the organ. In such cases, a blister over the epigastrium and abdomen assists the beneficial operation of depletion, and with active purgation, and the other means already stated, soon restores the healthy actions of the organ.

In many cases of active congestion of the liver, the inflammatory condition of the organ soon supervenes. This seems to arise from the sudden engorgement of the vessels occasioning great distension of the substance of the viscus, and of its serous surfaces. Hence the pain felt in different parts of the region of the liver, the frequent disturbance of the pulse, the disorder of the functions of the stomach, &c. Hence also the sudden supervention of all the symptoms. This state of the organ is both more alarming in its

symptoms, and more dangerous as respects its issue, than even a moderate attack of active inflammation: for the quickness with which the engorgement of the organ is produced, evinces great power in the efficient cause of disorder; and, owing to the rapid change in the relative condition of the viscus, great risk to the various parts of which it is composed. Inflammatory re-action, also, is more apt to supervene to this state of extreme congestion; and, when so supervening, its progress is both rapid, and the height to which it advances very great. Under such circumstances, depletions, both general and local, ought to be promptly and decidedly put in practice: and as nothing tends more than emulging the biliary ducts to overcome that state of engorgement of both them and the gall-bladder which frequently co-exists with venous congestion, and heightens its severity and danger, full doses of calomel, with or without opium, according to the state of the stomach, ought to be immediately exhibited, and be followed, in a few hours, by a cathartic draught: and if a full operation be not soon afterwards produced, an ample purgative enema should be administered. In many cases of congestion, an emetic may be given with much advantage, after depletions have been practised; and in some cases, where the congestion is but slight, and the disturbance of the digestive organs apparently more the consequence of accumulation of bile in the gall-ducts and bladder, the exhibition of an emetic, and even its repetition, will be attended with advantage. In the more severe cases, however, of congestion, emetics are of doubtful benefit, unless copious depletions have been previously instituted, and the retention of a morbid and accumulated bile requires their exhibition. In every case of congestion of the liver, whether slight or otherwise, the practitioner ought to recollect that it generally is that state of the organ which originates the various forms of inflammation, and that abscess may quickly form after the supervention of inflammation upon the congested state.

With regard to the treatment of that form of disorder which I have denominated *torpor of the functions of the liver*, unconnected with chronic disease of the viscus, the exhibition of full doses of calomel at bed-time, followed by the bitter aperient medicine in the morning, has generally appeared to be most beneficial. Blisters over the epigastrium or hypochondriac regions, and repeated at intervals, are often serviceable. After the treatment has been conducted as above for a few days, the pil. hydrarg. combined with the pil. aloës cum myrrhâ, given at bed-time, and the bitter

aperient draught in the morning, has generally effected a perfect restoration of the biliary actions to a healthy state. In this form of disordered function, I have frequently exhibited the nitro-muriatic acid internally, and applied it in the form of the usual wash externally, over the hypochondriac and epigastric regions, night and morning, with the most decided advantage. After blistering has been had recourse to, much advantage has seemed to result from the continued application, over the epigastrium or right hypochondriac region, of a plaster, consisting of the empl. picis comp. and empl. hydrarg. or the empl. ammon. cum hydrarg. In cases of torpor of the liver, unconnected with congestion of the blood-vessels, or accumulation of bile, gentle tonics, combined with aperients, may be given with benefit; but where the torpor either results from a passive state of congestion and engorgement of the biliary ducts, or when the torpor seems to have produced these states of disorder, tonics would be manifestly injurious, and would lead to the supervention of chronic inflammation of the substance of the organ. Much advantage will be derived, in cases of torpor thus complicated, from the continued use of deobstruent aperients and the occasional employment of a full dose of calomel, followed by a cathartic draught, in order to carry off the accumulation of bile formed upon the liver, and the viscid secretions lining the mucous surface of the alimentary canal.

Much mischief frequently arises from combating some of the forms of disorder now treated of by stimulants and tonics, in order to rouse the functions of the liver, and counteract the supposititious state of debility by which they are often attended. In cases of increased determination of blood, producing augmented secretion of bile, and in cases of congestion and of engorgement of this secretion in the biliary canals, such treatment rapidly superinduces acute or chronic inflammation, and rapidly hastens organic changes and disorganisation of the substance of the liver.

Before I quit this part of my subject, I wish to impress upon the attention of the practitioner the necessity of instituting free and full purgation in those forms of disorder which depend upon congestion and torpor of the liver. I have already contended for the existence of considerable accumulations of tenacious mucus and feculent matters in the alimentary canal, particularly in the cæcum and cells of the colon, whenever these states of the biliary functions exist. But it is not by means of the simple operation of a purgative or two that such accumulations will be removed. Purgation should, in such cases, be prescribed daily, till the symptoms

are relieved and the motions acquire a healthy character. Many practitioners think they have done enough when they have given one or two smart purgatives, and are surprised that more advantage is not obtained from them. They say that they have purged freely, and that there is nothing particular in the appearance of the motions. This may be, in many respects, true; for the motions will often, at first, present but slight appearances of disorder, and yet, after the use of tonic and deobstruent aperients has been properly continued, the extent of accumulation of morbid matters in the alimentary canal, and of disordered bile in the biliary organs, soon becomes apparent in the foul and diseased state of the evacuations. In many cases, the practitioner, as well as the patient, will be greatly surprised at the immense quantity of disordered stools which will be removed in the course of a few days. When the abdomen is full, and furnishes a doughy feel upon examination, particularly in the region of the cæcum and course of the colon, the use of purgatives is indispensable. If, in addition to this state of the abdomen, the stools are offensive, or in any way morbid,—if they are viscid, tenacious, crude, dark-coloured, or spinage-like, or of a bottle-green tint, the repeated operation of purgatives is imperatively called for. The choice of medicines in such cases is a matter of some moment. In many instances of this kind, particularly when the liver is congested or torpid in function, the exhibition of a full dose of calomel at bed-time, and of the compound jalap powder in the morning, or the common black draught, will be the most advantageous. After these remedies have been continued for some days—generally five or seven days will be long enough—then the pil. aloës cum myrrhâ alone, or this with the pil. hydrarg. may be given every night at bed-time, and a wine-glassful of the mist. amar. cum sennâ early in the morning. This plan should be continued until the motions and digestive functions begin to assume a healthy character, when one only of the foregoing remedies may be given in the twenty-four hours, either at bed-time or early in the morning; or the pills may be taken on alternate nights, and the bitter purging mixture the following morning. These remedies generally produce full, but not frequent evacuations, and they succeed better than saline purgatives in bringing away whatever feculent or other matters may be retained in the cells of the colon. Watery motions ought to be avoided in the disorders under consideration; they merely distress and weaken the patient, without removing the morbid accumulations retained in the alimentary canal and producing disorder. Hence, salts given alone are gene-

rally productive of mischief; but when given in small quantities, with senna and bitter infusions, they generally act satisfactorily. When watery motions are frequent and of a dark colour, they show that there is some other offensive and more solid matter to be brought away, which may itself be the cause of purging, owing to the irritation it occasions in the parts of the intestines where it is lodged.

Debility often accompanies frequent watery motions, and there is often much restlessness, and an irritable state of the pulse. Patients who are distressed with this state of the bowels generally complain that they have been purged continually; and when credit is given to these representations, astringents and cordials are exhibited with a view of supporting their strength; but these often add to the disease and heighten the febrile symptoms. In these cases, the physician should always satisfy his own mind respecting the extent to which the purging complained of has proceeded. If he examine what has been passed, he will find that the numerous stools which have been the cause of complaint, amount not to a single moderate motion as regards quantity, and that, in point of fact, the patient has not been purged at all; the irritation and inclination to stool being mistaken for actual purging. The practitioner must take care not to be misled by such representations, and, notwithstanding the irritation and tenesmus which deceive the patient, full evacuations ought to be attempted by the means recommended for the purpose, assisted by such injections as are calculated to soothe the irritation of the rectum and sigmoid flexure of the colon, which occasions the small, inefficient, and deceptive stools. In no case should a practitioner take charge of a patient labouring under any of the disorders of the liver which have been now treated of, without examining the state of the motions daily and attentively. The appearances which these afford will readily indicate when opening medicines should be prescribed, and when they may be dispensed with. When it is necessary to keep up a laxative effect upon the bowels, in order to remove matters which have accumulated in them, without occasioning any directly debilitating influence from the operation, or exciting any increased action upon the mucous surface, the gentler aperients and tonic laxatives should be preferred. These ought to be prescribed daily for a considerable time; and on every fourth or fifth day a brisk cathartic may be exhibited, in order to carry off those matters which the laxatives have failed to remove. The advantages which belong respectively to cathartics, purgatives, and laxatives, are seldom sufficiently considered by

practitioners. Hence these medicines are frequently employed too indiscriminately and inadequately, and they consequently prove either inefficient or detrimental on some occasions; and thus, what has been called the purgative plan of cure has been improperly stigmatised. When I come to treat of the disorders of the larger intestines, I shall take occasion to enter more fully into this subject.

CHAPTER II.

ON INFLAMMATION OF THE LIVER.

In the observations already made respecting the more frequent functional disorders of the liver in warm climates, I have endeavoured to illustrate these disorders in their more simple and less complicated forms, and as giving rise to all the other derangements observed to accompany them, short of occasioning disease of a more determinate and specific kind. This mode of considering the subject seemed most advisable, inasmuch as those more dangerous and violent forms of disease which are to be considered hereafter, and which are often accompanied with functional disorders of the liver, will be better understood from the attention previously paid to this particular part of the subject. Besides, many of those more severe and fatal diseases to which Europeans are liable in a high range of temperature, originate in disturbances occasioned in the healthy functions of the biliary organs. The history of many cases of fever, dysentery, and diarrhœa, proves this position; and the remarks I have now to make will show the frequent dependance of the different degrees of inflammation of the liver upon those disorders of the viscus which have been discussed.

In many cases, inflammation of the liver will be ushered in by an increased secretion of bile, marking the dependance of such increase upon augmented determination of blood to the secreting substance of the viscus. In this case the additional afflux of blood runs on to active inflammation of the substance of the organ; and as inflammation, when originating in this manner, is often imperfectly and obscurely characterised by symptoms, or by the usually accompanying signs of vascular action, abscess frequently supervenes before the real state of disorder is detected. Such cases are often met with amongst those patients which, in public practice within the tropics, are admitted with the more prominent symptoms of fever or of dysentery; the disordered biliary secretion, resulting from increased determination of blood to, or inflammation of, the substance of the liver, occasioning the febrile or dysenteric symptoms, the urgency of which attracts the patient's whole attention masks the real source of mischief, and misleads the unwary or inattentive practitioner. In other instances, the accumulation of bile

upon the substance of the liver, and its acrid and stimulating properties, become a source of irritation, and kindles up that inflammatory action which the organ is already but too prone to undergo. And this result is still more to be dreaded, if, along with the accumulation of morbid bile, there also exist any degree of congestion of the blood-vessels,—a coincidence which may be considered as very generally obtaining.

As to the frequent supervention of inflammation upon congestion of blood in the vessels of the liver, there can be but little doubt. The knowledge of the connexion subsisting between both states of disorder is important, inasmuch as a suspicion even of the existence of congestion ought to lead to the adoption of such remedies as should prevent the supervention of consequences so much to be dreaded as inflammation and abscess of the substance of the liver. When, however, inflammation commences, as it frequently does, either in congestion of the blood-vessels of the organ, or in accumulations of acrid bile in the biliary ducts,—owing to the slight degree of disorder such states frequently occasion to the feelings of the patient, it seldom comes under the observation of the practitioner until the inflammatory action is very far advanced; and the derangements from which it originates are still less frequently the subjects of his notice,—they are the preliminary states of disorder, which, particularly when supervening slowly, excite no alarm in the patient until their consequences are fully effected, or have reached that state which is beyond the powers of science and art.

From these brief remarks, it may be seen that inflammation of the liver is very generally the consequence of some one or more of the functional derangements of the viscus which have already engaged our attention; and that when hepatitis does not actually proceed from these disorders as a direct consequence, it generally arises from the state of predisposition to inflammatory action, which functional disorders of the liver invariably generate. This is the conviction on my mind, and it is the result of a long and extensive experience; I am, therefore, most anxious particularly to direct attention to the subject.

Sect. I.—*On the Nature, Symptoms, and Causes of Inflammation of the Liver.*

Inflammation of the liver generally supervenes either as a primary disease, without any very apparent state of previous disorder, or as

a consequence of one or more of the functional derangements before alluded to. This latter mode of commencement appears to be the most common, and is frequently to be recognised in those cases of hepatitis which supervene upon intermittent, remittent, and continued fevers, and dysentery. In many instances the functional disorder ushering in the well-marked inflammatory state of the organ may not be attended to on the part of the patient, and may not come under the observation of the physician until the hepatitis is fully formed, or even advanced to some one of its usual terminations,—namely, abscess, chronic enlargement, &c. Even acute inflammation may commence primarily, and proceed for a number of days without producing so much disturbance or alarm to the patient as to induce him to apply for professional assistance. This is still more remarkably the case where the substance of the organ is the seat of the inflammation, when the danger of neglect is greatly augmented by the very ready disposition of inflammation of this structure to run into abscess. Hepatitis may, therefore, originate primarily without previous disorder; or it may supervene to functional derangement of longer or shorter duration.

But it is not only important to be aware of the mode in which hepatitis supervenes,—the practitioner should also bear in mind that it will differ very widely in its form, symptoms, and consequences, according to the particular part of the organ which is affected, and the extent to which the inflammatory action extends itself to adjoining parts. The signs, however, which indicate the existence of inflammatory action in any one particular part of the liver, and its limitation to that part, or its extension to other parts and different structures, are seldom so precise, or admit so very rarely of an obvious connexion with its real seat and extent that the most experienced practitioner cannot take upon himself to state the symptoms which are pathognomonic of inflammation of a particular part of this organ, in all cases and under every circumstance. He may, however, point out the phenomena which his experience has authorised him to consider as most frequently the result of inflammation of a certain surface or part of the viscus; but he can only offer them as an approximation to the truth, which an intimate observation, and various contingent and often indescribable circumstances in the history and existing state of a patient, viewed in connexion with these more definite signs, will enable the enlightened physician very nearly to approach.

Before I venture to detail the signs by which inflammation of the

liver is to be recognised, and by which we may rationally infer its limitation or extension to particular parts and textures, I shall endeavour to state succinctly the appearances which this organ presents in the inflamed state, and remark upon some of the various organic changes which more usually supervene to it, or with which it is most frequently complicated. As, however, I purpose to devote a section to the consideration of the pathology of abscess of the liver, I shall avoid, in this place, the consideration of such points as relate more intimately to that subject.

Inflammation of the liver may be limited to the following parts of the organ; namely, the superior or convex surface, the inferior or concave surface, the internal or parenchymatous structure, and the right or left lobe. The right lobe is most generally the seat of inflammation: both the right and left lobes are met with in an inflamed state at the same time, next in frequency; and the left lobe alone is the least liable to inflammatory action. Frequently the inflammation, particularly when seated in the superior surface of the organ, is limited by the broad ligament. When the surfaces are the seat of inflammatory action, the adjoining internal structure of the organ generally participates in it to a greater or less extent; and likewise when morbid vascular action commences in the parenchymatous structure, it sometimes extends to the external surface; but this more rarely occurs in India than the former mode of extension: the internal structure appearing to be more frequently the seat of the inflammatory state than the surfaces, which seldom participate in it until the more advanced stages of the disease. Sometimes, however, the inflammation of the liver may arise from the extension of morbid vascular action from an adjoining viscus, as from the stomach or duodenum; and in such cases the surfaces first become the seat of disease, which generally soon extends itself to the internal structure of the organ. When inflammation either attacks primarily the surfaces, or is extended to them secondarily, coagulable lymph is generally effused from them; but in such cases the peritoneal covering must be, or has been, actually inflamed; for the parts immediately subjacent to it will present every mark of increased vascular action, and yet the investing membrane will itself not be the seat of inflammatory action, to the extent, at least of throwing out coagulable lymph. In India the internal structure of the liver is frequently seen inflamed to the greatest possible extent, without any effusion of lymph from its surfaces; and the inflammation of structure may go on to the production of several abscesses in both its lobes, or of one very large abscess in the right lobe only,

without any decided marks of inflammation of the envelop of the organ, besides some alterations of colour merely, which shades of colour are usually occasioned by the states of the parts immediately underneath. Nay, even abscesses of the liver may proceed to their utmost extent, and ultimately break into the abdominal cavity, without having induced inflammation of the serous surface where they point, and, consequently, without forming adhesions to the parts with which they are in immediate and most close contact.

In many cases of inflammatory disease obviously affecting the stomach and biliary organs, it is very difficult to determine, from want of an account of their early progress, whether the inflammation commenced in the stomach, and extended itself to the biliary organs; or whether it began in the latter, and spread to the former. Such complications of disease are by no means uncommon in warm climates. When they end in death, either from the extent of disease in these particular organs, or from its extension to other adjoining viscera, the liver is generally found to be most remarkably diseased, or even the viscera, which were the last to undergo the morbid action; the stomach, which, although the first to evince disorder, presenting the least marks of it upon dissection. This very frequent, and indeed general, course of morbid phenomena, may be very easily explained, even upon the supposition that the stomach was the organ which first became disordered, as no doubt is the case in many instances; for disease, when it has extended to an adjoining organ, often becomes diminished in its original seat; and in cases where this is not the result, and where the superinduced disorder of the liver has led to still farther disease in the alimentary canal, owing to the morbid state of the secretions, the latest derangement in the chain of morbid phenomena not unfrequently mitigates, even when it fails of entirely removing, the originating malady. Illustrations of the above position are frequently observed by the intertropical practitioner, more particularly the military surgeon. He will often have occasion to remark, in soldiers, more especially those who are addicted to the inordinate use of spirituous liquors, that the functions of the stomach are amongst the earliest to suffer,—that this organ will present the signs of disordered function of the inflammatory action, and to them will supervene those of deranged secretion of bile, or of inflammation of the liver, —that the usual symptoms of dysentery also will be often added to the foregoing derangements,—that the signs of inflammation of the stomach will gradually disappear as the dysenteric disorder

increases,—and that, if the complication terminate in death, the large intestines, the seat of the last disorder in the course of morbid phenomena, will present the most remarkable appearances of disease, in which the liver will participate to a greater or less extent; the stomach being the least deranged in its structure of any of the organs betraying disorder during life, although the earliest to suffer, and apparently the longest to endure disease in a very marked and urgent degree.

It would obviously be a great attainment on the part of the practitioner, to be able to ascertain the commencement of inflammatory action in the liver, and the precise part in which it is seated. The former is, on many occasions, a point of great difficulty; the latter, frequently, if not generally, one of absolute impossibility. Indeed, it is not until after many years of varied and extensive experience of this disease, that the practitioner becomes enabled to decide, with any degree approaching certainty, respecting even the organ which is disordered in the earliest stages of complaint; and even after all his observation and boasted tact, whether mental or manual, in the discovery of hepatic derangement, he will often be obliged to confess the difficulty of the subject, and see cause for still farther perseverance in the career of close observation which he has been pursuing. This, it will be said, is a humiliating confession; but it is made with a conviction of its truth, and with the still consoling feeling, that the intimate observer and experienced inquirer into the progress and phenomena of disease, will have numerous instances of evincing the commanding fruits of his labours, even at the time when he has occasion to regret that his powers of discrimination have not carried him still farther. He will often have occasion to know that there are cases wherein it is difficult to determine, particularly in the early progress of complaint, whether the stomach, the biliary organs, the duodenum, or the right flexure of the colon, is the seat of disorder, or the extent to which either the one or the other is affected. This difficulty, it must be admitted, is often owing to fortuitous circumstances; and amongst these may be enumerated, the want of sufficient information as to the causes of disorder and its early progress; insufficient opportunities of investigating its history and existing state; and the imperfect account which many patients give of their feelings and symptoms. Amongst these difficulties in the way of obtaining a satisfactory knowledge of the existence, extent, and complications of diseases of the liver, particularly of inflammation of this viscus, there is one which respects the practitioner himself. The importance of investigating

into every circumstance calculated to throw light upon the seat and nature of a complaint, cannot be impressed upon any person's mind more fully than it generally is upon the mind of the scientific and conscientious practitioner. Such investigation furnishes the basis upon which he has to found all his curative indications; but the practitioner placed at the head of a military or other hospital, wherein he has to see twice or thrice daily, and prescribe for, from 300 to 400 patients labouring under intertropical diseases, with either no assistance, or imperfect assistance, beyond the compounding of the medicines directed by him, will often find it utterly out of his power to accomplish his intention on every occasion where he is desirous of performing it, more particularly when he has to follow the operations of an army.

Every experienced observer will also readily acknowledge, that, when judging of the seat of disorder and of its extent, he is guided as much by certain appearances, which he cannot satisfactorily describe, and by the relation which various signs and circumstances in the progress and state of a case bear to each other, as by the existence of specific symptoms, upon which many are disposed entirely to rely. Repeated observation has convinced me that even the most prominent signs, when trusted in alone, will often mislead, and that they are chiefly to be relied upon when viewed in connexion with other signs of a less obtrusive nature. This should be kept in view by the medical adviser who has yet to acquire experience of the diseases about to be considered. While he reposes confidence in those who furnish him with the requisite instruction to enable him to observe and to judge for himself, he should endeavour to procure still more accurate information from his own practice; but, in order to be valuable, it must be obtained from an intimate view of every circumstance which tends to change the usual phenomena, progress, and succession of diseases, or to modify the results.

Before I enter upon a statement of the symptoms indicating inflammation of the liver, I have considered it proper to offer the foregoing observations respecting the very silent, unobtrusive, and insidious manner in which the most dangerous form of inflammation of the liver commences and makes early progress. This has appeared to me the more necessary, as teachers and books have generally furnished the student with certain ideas respecting this disease, which he will only occasionally find to be correct; and if he trust to them uniformly, or even generally, as he is disposed to do until experience teaches him his error, he will be frequently the uncon-

scious cause of most serious neglect, and consequent mischief. The sources of information just alluded to, but too often furnish absolutely, and, with few exceptions, certain symptoms as being characteristic of hepatitis, which either supervene but occasionally, or not until the disease has advanced almost to its acmé. They have but too frequently omitted to state what is very important to be known before the practitioner enters upon the discharge of his practical duties, and left him to learn, but inadequately provided with the requisite assistance, what considerable time and observation, and his errors, only can teach him, when acting on his own judgment, without sufficiently accurate guidance.

When it is not, from the nature of the subject, in the power of a writer to state with precision, or to describe with accuracy, the varying phenomena, contingent signs, and the numerous and daily-changing shades which characterise the state and progress of diseases, and mark their differences, he should make his reader aware of the difficulty, and not mislead him by stating what is true in some cases only, and under certain circumstances, as obtaining on all occasions, or at least with few or no exceptions. But although it is thus necessary, in many instances, to state with reservation, and to describe phenomena as they actually occur, let it not be imagined that even the most obscure inflammation of the liver may not be detected by the careful observer, if he direct his attention with assiduity to the subject. The reason that these diseases have so frequently run their course, even to a fatal termination, and yet have not been detected by the medical attendant until dissection showed him the extent of structural disease they had produced, is to be ascribed to the circumstances just alluded to; namely, to confident statements of symptoms as pathognomonic of the disease, which symptoms are by no means of constant occurrence; to the neglect of others, which, although less obtrusive, are, when viewed in connexion especially, much more certainly to be depended upon.

To attain to the power of thus discriminating the nature and extent of the most obscure disorders which the practitioner will be called upon to treat in warm climates, much careful examination of the usual symptoms and causes of disease must be instituted; their various relations, with the circumstances wherein they differ, and the reasons of their difference, must be duly weighed during the treatment of the patient; and, in such cases as terminate fatally, their connexion with organic changes ought to be most assiduously traced by means of *post mortem* research, whenever it can be put

in practice. The effects of remedies, also, in changing the usual march of deranged action, should be noted with accuracy, and taken advantage of in their employment; and, on all occasions, the means of counteraction resorted to should be in due relation to the extent of disorder and their previously ascertained mode and power of operation.

As, however, the most experienced practitioner cannot accomplish all that may be wished by others, or even sought after by himself,—and as knowledge is so slowly progressive that very few can advance it, even in their own immediate province, more than a single step, leaving many to those who may come after them,—I shall endeavour to describe the diseases under consideration as faithfully as I am able, expecting, if it shall be found that one small step of advancement has been made by me in the particular path which I have been pursuing, that it will prove the cause of adding many more, by means of those who are more competent than myself to their satisfactory performance.

I have already observed, that inflammation of the liver frequently originates in some one or more of the functional disorders of this organ, and, in such cases, it is very often difficult to ascertain when the inflammatory action commenced; for, during the first period of hepatitis, thus originating, there is seldom any other symptom present than what has already been assigned as characterising functional disorder of the viscus; indeed, the vascular congestion may be considered as a part of the inflammatory process. Hepatitis, also, proceeding from any one or more of these functional derangements, generally commences in the internal structure of the organ, which possesses a very low state of sensibility, and which may be deranged to a very great extent without affecting the system in a manner sufficient to alarm the patient, or even to rouse the attention of the practitioner to the state of this particular organ. I have also remarked, that inflammation of the liver may be seated more particularly in some one of its surfaces, or in its internal structure; that the former is not, perhaps, more frequently met with than the latter; and that, when the surfaces become inflamed, the substance of the organ generally participates in the disease to a greater or less extent; whilst, on the other hand, when inflammation commences in the internal structure, it may go on to the production of its worst consequences, without any extension of it to the envelops or surface of the organ. From this it may be inferred, that it cannot always be determined even when the symptoms are the most precise, when the inflammation is limited to the surface of

the liver, since such limitation is but seldom observed; nor can it be ascertained as to the extent to which the disease may proceed through its substance. But, as such extension of diseases very generally occurs, and is attended with certain appearances, it will be safer to infer its existence whenever these appearances are observed, although they may not be always uniform to their grade, or even universally present.

In order, however, to give greater precision to what I have to state respecting the history of hepatitis, I shall first describe fully the morbid phenomena attendant on this disease, with a particular reference to the symptoms and appearances by which we are to be guided in determining the existence of the more active inflammation of the substance of the liver; and shall afterwards offer some reflections on those signs which more particularly characterise inflammation of its surfaces; and conclude the discussion of the subject with some observations on the phenomena which have generally appeared to mark inflammation of both structures of this important organ.

Inflammation of the liver has been usually arranged by systematic writers into acute and chronic; the former commencing in the surface of the organ, the latter in its parenchymatous structure. However consonant this division may be to the hepatitis of temperate climates, and however chronic the inflammation of the internal structure of the viscus may there prove, neither this division of the subject, nor the general character here assigned to an important form of the disease, can be extended with justice to the hepatic inflammation of warm climates. Although inflammatory action, commencing in the surface of the viscus, almost always assumes an acute form in these climates, as well as in temperate countries, yet, when seated in the parenchymatous structure, it does not always assume the chronic form, as is very generally observed there. Within the tropics, the most active kind of inflammation of the liver, as respects many of the symptoms characterising the disease, as well as its duration, affects both the substance of the organ and some part of its surface; so that in these climates, at least, acute hepatitis may commence and be seated in the former structure as well as in the latter, although, perhaps, it more frequently originates in the one, and extends to the other.

Inflammation of the substance of the liver seldom commences with a well-marked rigor or chill, unless after exposure to a powerful exciting cause operating upon the system from without, as cold or wet, currents of air, night dew, or malaria. When chills or rigors mark commencing inflammation of the internal structure

of the organ, there are generally one or more of the symptoms I have enumerated as characterising congestion also present. Indeed, a congested state of the organ about to be diseased always accompanies that particular condition of system which gives rise to rigors, if it does not actually cause this particular phenomenon; and it generally accompanies inflammation of the substance of the organ, to a greater or less extent, throughout its progress. The patient usually complains, about this time, of oppression, weight, and uneasiness about the pit of the stomach and right hypochondrium, extending sometimes under the ensiform cartilage, and in the direction of the diaphragm and mediastinum to the back and shoulder-blades. These symptoms are usually increased upon a full inspiration, taken at the time when pressure is made beneath the ribs, or when pressure upon the stomach and back is made at the same time. The pulse is, at this very early period of the disorder, scarcely affected; but it soon becomes accelerated towards night; it is often slower and more oppressed than usual, and occasionally irregular or remittent. The countenance is now usually pale, sallow, or somewhat anxious; the spirits considerably depressed; the tongue yellowish, white, or more or less foul, and the patient complains of loss of appetite and of sickness, with an unpleasant taste in his mouth. The bowels are often irregular, but at first generally costive, and the urine is in small quantity, loaded, and high coloured. There is sometimes headach, and generally a disturbed sleep, and often slight dyspnœa and sighing, with oppression at the chest and epigastrium.

As the disease of the internal structure of the liver advances, the pulse becomes quicker, fuller, and more irritable in its beat during the evening and night, and it is often oppressed and embarrassed during the morning and day, and sometimes throughout, unless copious depletions have been practised early in the disorder; the sense of uneasiness in the region of the liver and epigastrium is often augmented; and if vascular fulness of the organ be great, the patient complains of a heavy, dragging pain, increased on sudden motion, or by turning suddenly in bed. There is often a short, suppressed cough, dyspnœa, with shortness of breathing, a catch in the respiration, particularly after quick motion. Upon examination, in these cases, tumidity of the viscus may be often ascertained from its protrusion beneath the ribs and scrobiculus cordis. The easiest position is usually upon the back, or sitting gently bent forward. All these symptoms are generally increased upon taking food; and the pulse is now much accelerated, especi-

ally towards evening. Difficulty of lying upon the right side is not always present, and pain in turning to the left side is not often felt, unless the change of position be made suddenly. The tongue at this stage of the disease is generally coated, and of a yellowish or brown colour; it is frequently also dry, particularly at its middle. The pain sometimes complained of at the top of the right shoulder, and so improperly stated as being one of the chief signs of hepatitis, is, when present, certainly characteristic of the disease in the right lobe; but, this symptom is only occasionally present; and he, who has been taught to look to this as a distinctive mark of the disease, infers, when it is not observed, that the liver is sound. With respect to the pain actually accompanying inflammation of this organ, I may state that it is often felt in the region of the liver, in the lower part of the thorax, and in the epigastric region; it is sometimes referrible to the top of the right shoulder, frequently to the right shoulder-blade, and occasionally to both scapulæ; it is, on some occasions, seated in the back, between the lower angles of the scapulæ, and, in some instances, the only pain which has been complained of has been in the loins. I have observed it, in a few cases, in the right clavicle and its vicinity; and in others, in the left shoulder and shoulder-blade only. In many cases, pain is increased in the situation of the disease, or in its vicinity, upon quick motion, upon making a false step, or upon turning suddenly from one side to the other; and, in a few obscure cases, pain is complained of only on such occasions. When the internal structure of the organ is affected, the pain in the hypochondriac and epigastric regions is seldom acute; there is most frequently a sense of aching or dragging, with oppression at the præcordia. Pain is seldom acute, tensive, or pungent, unless the surfaces or ligaments become affected. There is usually great distress at the epigastrium and præcordia, accompanied with frequent sighing, particularly when pressure is made simultaneously on the right hypochondrium and under the right shoulder-blade. I have seen a few cases where pain followed the course of the muscles of the right side of the neck: it often extends from under the ensiform cartilage, in the direction of the mediastinum, to between the shoulder-blades; and when this is observed, oppression, dyspnœa, or a sudden catch in breathing, and a dry cough, generally accompany it. Pain frequently, also, extends from the right side, under the shoulder-blade, to the spine, where it terminates. On many occasions, when great congestion of the vessels of the liver seems to accompany inflammation of its substance—the right lobe becomes very much

enlarged, and rises up into the right cavity of the thorax, occasioning great oppression at the chest, fulness at the epigastric region, dyspnœa, frequent dry cough, and sometimes acute pain, owing to the great distension of the covering of the liver at this part, with an increased discharge of mucus from the bronchi. In such cases, the exacerbation of pain in the chest, upon a full respiration or on coughing, the flushed or tumid state of the countenance, occasioned by the interrupted circulation through the lungs and the seat of the complaint, are apt to make the inexperienced practitioner mistake the disease for pneumonia. In cases of this description there is generally more or less pain or uneasiness felt about the shoulder-blades, or top of the right shoulder, or between the scapulæ; and often numbness of the right arm, with pain about the insertion of the deltoid muscle, or at the wrist.

Nausea and vomiting are often concomitants of the more acute attacks of inflammation of the substance of the liver; but when they are present in an urgent or continued manner, there is reason to suspect that the concave part of the liver which is nearest to the stomach is affected, and that considerable disorder may extend from the liver to the stomach, and proceed, in the course of the hepatic ducts, to the gall-bladder and duodenum. In such cases, the patient complains of a sense of fluttering, weight, and fulness, at the right hypochondriac and epigastric regions,—sometimes of pain in the abdomen,—and he reclines chiefly on the left side: the stools are generally watery, frequent, scanty, and very dark coloured, with tenesmus and many of the symptoms of dysentery, for which disease it is often mistaken. Even when but little sickness at stomach is present, there is always loss of appetite in the more acute forms of the disease, heartburn or griping pain about an hour or two after meal, considerable thirst, with low spirits; and the patient often reclines upon the back or left side, in preference to any other position.

As the inflammation of the internal structure of the liver advances, the febrile symptoms, particularly towards evening, become more marked. The pulse is more frequent, and its beat irritable; but it often varies greatly, both in frequency, regularity, and development; so that, viewed singly, but little dependance can be placed upon it. The state of the tongue is somewhat more to be relied on: it is generally, in recent cases, covered with a white, or with a yellow or yellowish-brown fur, approaching to a brown or brownish-black in the worst cases. Early in the disease it is moist, but it becomes dry in the middle, and afterwards at both middle and sides,

in the advanced stage of the most acute cases. When the disease is checked at its commencement by appropriate treatment it continues moist though excited throughout. In cases of the disease supervening to previous disorder of the alimentary canal, or after repeated attacks of hepatic disorder, the tongue seems often smooth and glossy, marked by fissures, and lobulated; and these are often amongst the worst cases, and are most frequently met with in those which are about terminating, or have already terminated, in abscess. In many instances, particularly when the inflammation has supervened to congestion and accumulation of bile on the biliary apparatus, and to a foul state of the mucous surfaces, the coating of the tongue is thick, and the papillæ of the organ very large and distinct.

The state of the countenance and skin deserves attention during the progress of disorder. At its invasion, particularly when attended with chills or rigors, the countenance is pale or sallow, and the skin shrunk and pale on the extremities, but often natural on the trunk. As the inflammatory action becomes developed, the countenance fills out more fully; and when there is great fulness and oppression in the region of the liver and chest, the face often becomes fuller than natural, with some degree of dusky redness in the cheeks. The countenance and eyes, however, still possess a murky, muddy, or sallow hue*, and more or less of a dark circle surrounds the eye, particularly beneath it. The tunica albuginea is either of a yellow tint, or of a dull white or pearly hue. The patient often complains of pain in the forehead and over the eyes. The skin on the trunk, especially towards evening, is generally warmer than natural, and is sometimes attended with a greasy feel, and a scanty or partial perspiration. When perspiration is copious, it is frequently very offensive. A certain degree of jaundice is often remarked in the hepatitis of Europe, especially when it terminates in abscess; but jaundice is not a frequent concomitant of hepatitis in India, unless when the ducts or gall-bladder become involved in the disease, or when it supervenes to biliary calculi and obstruction of the ducts. The countenance and eye are, however, always deficient of clearness, and possess a sickly expression.

Great importance should always be attached to the state of the secretions and excretions in all forms of hepatitis, particularly when there is reason to suppose that the internal structure of the viscus

* This appearance of the skin and countenance, so often seen in the advanced stages of the visceral diseases of warm climates, I am induced to impute more to the absorption of the dark, morbid secretion which so frequently lines the alimentary canal in these disorders, than to the presence of bile in the circulation.

is the seat of disease. In those cases originating without any previous derangement of function, the bowels are generally costive early in the disease, and the stools often evince no very serious or marked disorder of the biliary secretion until the disease has made considerable progress. The urine is, however, high-coloured, in small quantity, and loaded from the commencement, and the patient often complains of scalding in passing it. If the stools betray either a deficient secretion of bile, or a morbid state of this fluid, the urine is nearly always of a deep colour, and often deposits a dark or brown flaky sediment. When inflammation of the substance of the liver arises out of a congested state of the organ, with accumulations of acrid or morbid bile in the hepatic ducts and gall-bladder—the stools are disordered from the commencement; they are generally irregular, foul, dark-coloured, and fetid. Sometimes they are of a dark-green colour, and watery; at other times feculent and brown; but generally frequent and offensive. This state of the bowels is often attended with tenesmus, owing to the irritation of the morbid biliary secretion on the mucous coat of the rectum; and hence dysenteric symptoms may supervene to this stage of the disease, and may mask the hepatic disorder from the detection of the practitioner. Thus generally originate those more obstinate forms of dysentery which require depletions, purgatives, and a mercurial course for their removal.

A deficiency of bile in the stools is generally observed in the hepatitis of temperate climates; but this is not always remarked to any considerable extent in warm climates: this fluid is, however, always of a more or less morbid appearance, and is evidently secreted of a diseased and acrid description, independently of the changes induced in it during its passage along the alimentary canal, and from the admixture of the intestinal secretions. This diseased state of the bile has been observed in almost every case wherein the appearance of the motions was duly attended to; so that, as respects healthy bile, it is seldom present, as long as the disease continues unsubdued; and it is more frequently observed very deficient in quantity than too abundant.

It will be seen from the foregoing enumeration of phenomena presented by inflammation of the substance of the liver, that there is no one uniformly present, or by itself sufficiently characteristic of the disease. Yet, when viewed in the aggregate, and their mode of supervention duly considered, they may be relied upon with much confidence, particularly when considered in connexion with numerous other appearances in the state of the patient, and with various

shades and combinations of disorder, which scarcely admit of description, and which change their characters in almost every case, according to the internal relations of morbid functions, and the external influences to which they are subject.

When inflammatory action supervenes in the substance of the liver, either primarily or to previous disorder of function, it is very indeterminate in its progress: it may possess almost every degree of activity, and, consequently, may vary in duration from three or four days to as many months, according to the activity of the exciting causes, the predisposition of the organ, the habit and temperament of the patient, and the treatment employed; and as these circumstances may combine, so will the inflammatory action be disposed to terminate in resolution, in abscess, or in some other organic change. Before, however, I direct attention more particularly to these modes of termination, I shall remark first upon the symptoms denoting inflammation of the surfaces of the organ; and next, upon those which seem to evince the existence of inflammatory action in particular parts of the viscus.

When the surface of the liver becomes the seat of inflammation, either primarily, or from the extension of the morbid action from an adjoining part of its substance or some other viscus, the symptoms assume a more acute and definite character. Febrile signs are more prominent, and often supervene to slight rigors and chills; the pulse is generally much accelerated, and hard; the pain in the right hypochondrium is more or less acute; and when the upper surface of the right lobe is affected, or when great tumefaction of this part is present, so that it rises up into the chest, considerable pain and tension are also felt in the right thorax and under the ensiform cartilage and sternum, so as to resemble an attack of pleuritis. There is also cough, much increase of pain, or a catch, upon a full respiration, or upon pressure, especially when made at the time of a full inspiration. When the whole of the upper surface of the organ is the seat of inflammatory action, the attack may be mistaken for pneumonia. The oppression, difficulty of breathing, pain in the course of the diaphragm and under the sternum, being generally considerable.

Inflammation attacking the surfaces of the liver is also attended with greater heat of skin, and with a more unnatural dryness of it than when the disease is seated in the internal structure. The tongue is generally drier, and more coated; thirst greater; and general uneasiness and distress more marked. But the increased heat and dryness of the skin and tongue, and the character of the

constitutional symptoms, should be viewed more as the result of the symptomatic fever accompanying inflammatory action, than as symptoms belonging to hepatitis: they are the usual phenomena resulting from inflammation of an acute form, seated chiefly in serous membranes.

With respect to the excretions from the bowels, they are very variable in this form of hepatitis: they are often diminished in quantity and frequency, unless when aperient or purgative medicines are taken, and occasionally they are looser than usual. They often betray a deficiency of bile; but in warm climates this is a comparatively rare occurrence in inflammation of the surfaces of the viscus, unless when the disease has supervened to torpor, congestion of the liver, or accumulations of bile in the hepatic ducts and gall-bladder, when the biliary secretion is rather obstructed in its passage into the alimentary canal, than actually deficient. In such cases, however, the stools assume a bilious character, after the employment of a few doses of some purgative medicine. More frequently, however, the stools evince the secretion of unhealthy bile. That this fluid should be both increased in quantity, and in some respects changed in quality, may be expected from the anatomical and physiological relations of the seat of disease. When the surface of the liver, either wholly or in part, is the seat of inflammatory action, this action is very seldom, in warm climates, limited to the surface itself, but is generally extended, in a greater or less degree, to the structure immediately beneath. The increased vascular action also existing in the surface is usually attended with excitement of the organ generally, and with augmented determination of the arterial circulation throughout its substance. Hence increased secretion of bile, with some change from its usually healthy character, is more generally the consequence than its contrary,—a diminished flow of this fluid, which is oftener observed in the disease of the parenchymatous structure of the organ. When the bile is secreted in excess, and of a morbid quality, it often excites or irritates the mucous surface of the alimentary canal, to the extent of occasioning a morbid increase of the alvine evacuations; and this effect may go on—as already stated with reference to inflammation limited more particularly to the substance of the liver—to the production of diarrhœa, tenesmus, or even dysentery, in addition to the hepatic disease. When inflammation attacks the surface of the liver, the urine is generally high-coloured; but as long as bile is freely secreted and excreted, the urine seldom betrays the existence of bile in it. When, however, the bile is retained in the ducts and in the

gall-bladder, or when it is imperfectly secreted, the urine is often muddy, and deposits dark-brown flakes.

I have already said, that when the superior surface of the liver is the seat of inflammation, the symptoms are often more referrible to the chest than to the region of the liver; and this is more remarkably the case when the morbid action of this surface is complicated with general congestion and tumefaction of the organ. In such cases, coagulable lymph is sometimes thrown out upon the convex surface of the liver, and inflammatory action is thereby induced in the peritoneum, covering the abdominal aspect of the diaphragm; and hence, in the more advanced progress of hepatitis affecting the convex surface, symptoms of diaphragmitis frequently supervene, complicated with those of the liver, and with considerable symptomatic disease of the lungs. In cases of this description, the febrile symptoms and distress of the patient are very prominent. He breathes chiefly by means of the intercostal muscles, and experiences great anxiety about the epigastrium and præcordia, with a sense of tension or stricture across the chest, and an inability to sit or lie otherwise than in a bent-forward position, or sometimes upon the right side. The cough is frequent, hard, and suppressed, with great increase of the pain, and an inability to take a deep inspiration. The cough is often attended with expectoration of mucus, and is followed by much headach. The countenance is full, anxious, and dusky; and the eyes prominent, heavy, and sallow. There are, also, shortness of breath, inability of motion, and often considerable fulness beneath the false ribs and at the epigastrium.

When the outer surface of the right lobe is more remarkably inflamed, the painful symptoms are then clearly referrible to the right hypochondrium and margin of the false ribs. The patient generally lies upon the right side and back; the pain is often increased by turning quickly to the left, and by external pressure, and often a fulness may be perceived under the margin of the ribs. Pain then also extends around to the right scapula, and sometimes to the right shoulder. The other symptoms are nearly the same as those already stated. In some cases the temperature of the surface of the right hypochondrium and epigastrium is higher than in any other part of the body.

When the inflammation commences in the concave surface of the liver and the posterior margin, or extends to these situations from some part of the internal structure of the viscus, then the functions of the stomach are prominently deranged. Nausea and vomiting are often present, particularly a few minutes after sub-

stances are taken into the stomach. The thirst, anxiety, and pain at the epigastric region, are urgent, and there is usually much pain in the back, and sometimes in the right shoulder and muscles of the right side of the neck. The pulse is variable, but generally irritable, quick, small, contracted, or hard. There is often felt a sense of fluttering at the scrobiculus cordis, with a heavy dragging pain in the same situation; anxiety and frequent sighing; and sometimes, in the advanced state of the disease, hiccup is present, especially after cold fluids are taken into the stomach. The patient generally reclines upon the left side, or leans gently forwards. All these symptoms become more urgent if the inflammatory action have extended to the gall-bladder, to the ducts, or to the stomach itself. When such is the case, there is generally a sense of burning felt at the epigastrium, with fulness, frequent and painful eructations of flatus, very quick pulse, with cold, clammy hands, and increased heat of the trunk. The vomiting is frequent and painful, the urine in small quantity, and the stools watery, scanty, and often morbid and offensive. When the ducts and gall-bladder are affected, the pain is felt darting to the right side and back, and from under the ensiform cartilage, in the course of the mediastinum, to the spine: sometimes it extends from the epigastrium to the umbilicus, and back to the right hypochondrium. Singultus and acrid eructations not unfrequently also supervene as the disease advances, particularly after substances are taken into the stomach. The patient can seldom bear pressure on the right side and epigastric region, and feels increased uneasiness upon a full inspiration. Increase of uneasiness merely cannot, however, be considered as a distinctive sign of the seat of the inflammation, as this function is more or less affected, particularly on attempts to fill the lungs, in all the stages and forms of the disease: the degree, however by which the breathing is affected, and the seat of pain or uneasiness, upon taking a full inspiration, is often a guide to the actual state of disorder. A similar remark may be applied to the pain and uneasiness frequently felt upon making a forced expiration; for this means of ascertaining the seat of pain ought always to be practised, whenever the exact nature of the case is in any way doubtful. There are also observed great restlessness and want of sleep, a foul state of the tongue, with large, foul, and brown papillæ. If the tongue become clean from the treatment, the papillæ generally remain long excited or prominent.

When the left lobe of the liver is alone inflamed—a circumstance of rather rare occurrence—the more acute symptoms are

observed upon the left side. The left lobe is most frequently inflamed, in conjunction with the right lobe; and when this is the case, the more prominent symptoms are met with on the right side, but the left side is also complained of. Most frequently, however, in this latter case, the symptoms are referred more to the epigastric region. When the left lobe is inflamed, the stomach is very liable to distensions from flatus; and this distension taking place more especially in the direction of the left side, the liver is often thrown more to the right side.

Before concluding those observations which more immediately apply to inflammation of the surfaces of the liver, I should observe that, although inflammation of the substance of the organ more frequently supervenes to functional disorders of this viscus, yet the continuance or great extent of these disorders will sometimes give rise to acute inflammation of its surfaces. Thus, the great distension of the liver resulting from congestion of blood in the portal and hepatic veins may, by the injury sustained by the serous covering, from its unusual stretching, induce inflammatory action of some part of its surface. It should also be remarked, that, although in temperate climates inflammation affecting chiefly the surface of the organ generally assumes the most acute form, and arrives the soonest at some one of its usual terminations, inflammatory action of the substance of the organ being there more prone to put on a chronic or protracted character, yet such is not uniformly the case in warm climates. In these latter, more especially, inflammation of the internal structure frequently assumes, as active a form, and as quick a course, although by no means so prominent a character, as that of the surfaces of the liver. The reverse, however, is also frequently seen. But it is important to recollect that inflammation of the substance of the organ will often proceed as rapidly to an unfavourable termination, and that termination be of as dangerous a kind, as the disease of its surfaces, and that the one requires as decided a plan of treatment, and even more so, than the other, notwithstanding its more obscure progress.

Although inflammation of the substance of the liver alone often supervenes, yet it is comparatively seldom that inflammatory action of the surfaces is limited to them alone: it most frequently extends to the subjacent parenchymatous structure, or to adjoining portions of the peritoneum, or to both. When such is the case, those symptoms which mark the presence of inflammation of the surfaces, according to the part of the surface affected, will be conjoined with some of the signs characterising disease of the substance

of the liver. In these cases generally will be remarked considerable acuteness of symptoms, with increase of fever in the evening; urgent thirst; evident disorder of the alvine evacuations, with a morbid condition of the biliary discharge; offensive state of the stools; tumefaction of the right hypochondrium and epigastrium, with flatulency of the stomach and occasional sickness. The tongue is loaded, foul, and excited; the pulse frequent, irritable, sometimes small, and irregular in frequency, fulness, and strength. There is also great restlessness, especially in the evening and night, with want of, or disturbed, sleep. The skin is hot and dry on the trunk of the body, or hot and greasy to the feel. There is more or less anxiety and oppression in the epigastrium and at the præcordia, with sallowness of the countenance, and heaviness of the eyes. The pain at the right hypochondrium, in the right thorax, or at the epigastrium, is often considerable, and is increased by a full respiration, by cough, or by pressure. When the right lobe and posterior edge of the liver are the seats of the inflammation, the pain extends under the inferior margin of the right scapula to the back, and sometimes to the shoulder, down the arm, and to the clavicle. There is at first an increase of pain upon lying down on the right side, which is diminished after a time; and there is also much increase of the pain upon turning quickly to the left side.

The terminations and consequences of inflammation of the surfaces of the liver, are resolution, adhesions to adjoining surfaces and viscera, and the extension of the morbid action to the substance of the liver, to the gall-bladder and ducts, and to the peritoneal surface of the stomach, duodenum, colon, or right kidney. When the inflammation affects the substance of the organ, as well as the surface, the termination in abscess frequently occurs, if the disease is not actively treated at the commencement; and even when it is treated judiciously, a certain degree of vascular disorder and tumefaction of some part of the viscus may still remain, particularly in scrofulous habits, which may go on to the production of small abscesses, or to the formation of tubercles, and other chronic organic changes of the organ.

When the convex surface of the liver is inflamed, either primarily or secondarily, coagulable lymph is often soon poured out from the inflamed surface; adhesions to the diaphragm are thus formed, and the inflammatory action often extends to the thoracic aspect of the diaphragm, and to the opposite part of the lungs; and thus abscesses, which point in this direction, not unfrequently break either in the bronchial ramifications of the lungs, or into the

cavity of the chest when adhesions between the diaphragm and the lungs are not formed, or are incomplete.

When the inflammatory action is thus extended from the convex part of the liver to the diaphragm and lungs, the pectoral symptoms become more marked; the pain and oppression at the bottom of the chest are more distressing.* The cough is painful, often in paroxysms; is at first dry, and afterwards attended with an expectoration of watery mucus; sometimes singultus is observed; and the patient generally stoops forward, or lies on the left side, with the trunk bent. There are great restlessness, anxiety, and want of sleep, with increased anxiety of countenance, well marked hectic symptoms, loss of flesh, and a quick, irritable pulse. Respiration is short, difficult, and performed chiefly by the intercostal muscles. As the disease advances to the diaphragm and lungs, the hepatic disorder sometimes becomes diminished, and at last declines altogether, soon after the inflammatory action of the lungs is fully established. When abscess of the liver thus finds its way into the lungs or thorax, and is evacuated in these situations, the event may readily be recognised.

When inflammation extends from the concave and posterior part of the liver to the gall-ducts, gall-bladder, or stomach and duodenum, the symptoms are seldom so well defined as to admit of our drawing any precise inference as to the part or parts actually affected. Although the inflammatory action may advance to one of these parts only, yet all of them, when the disease affects the concave surface of the organ, are deranged in function in a greater or less degree; and hence the symptoms will be referrible to all, rather than to any one viewed singly. Indeed, this is a necessary consequence of the vascular and nervous communications existing between these viscera. Whether the inflammatory action is extended to the stomach, duodenum, gall-bladder, and ducts, simultaneously or consecutively, or to one of them only, we always observe sickness at stomach, tenderness of the epigastric region, and anxiety; frequent vomiting, occasioning great pain during and after the operation; sometimes a burning sensation about the epigastric region, with much fulness † and flatulence. Great pain, in-

* There is occasionally some degree of tightness; but when this symptom is complained of, I have generally inferred the existence of distension of the gall-bladder and hepatic ducts from biliary accumulations, the common or cystic duct, or both, resisting the flow of bile into the duodenum.

† When the inflammation is seated in the concave part of the liver, there is seldom so much fulness or distension felt in the right hypochondrium, as there

creased on pressure, is also often felt in or near the angle formed by the spine and right scapula. The skin is hot on the trunk, particularly in the region of the liver, and often covered with a cold, clammy perspiration on the extremities: there is sometimes slight jaundice and an anxious aspect of countenance. The tongue is generally much loaded, particularly at the root; and the bowels are constipated, or the stools scanty, dark-coloured, watery, and offensive. If the ducts become involved in the inflammatory action, the vascular turgescence sometimes seems to be so great as to diminish, or altogether shut up, the calibre of the ducts, either at the termination of the common duct, or in the course of the hepatic or cystic ducts. When this takes place, jaundice generally supervenes *, with sickness, vomitings, oppression, fulness, and increase of pain in the right thorax and hypochondrium and in the epigastric regions; the pain generally also extends in the course of the seventh rib, under the right shoulder-blade, to the spine.

I have never met with any instance of diseased appearances of the gall-bladder and biliary ducts, upon dissection, uncomplicated with disease, either of the liver, pancreas, or of some part of the alimentary canal. And, although I believe that inflammation may supervene in these situations primarily, yet I consider that they most frequently become deranged consecutively—from the extension of inflammation from the liver on the one hand, or from the duodenum on the other.

Having described the symptoms marking the usual progress of inflammation of the liver, I shall now notice the appearances observed on dissection of those who have died from this disease, or from some other disease, with structural disorder of this organ. Dissections of individuals dead from fevers or dysentery, frequently present us with inflammatory appearances of the liver in every stage of their progress, without having reached that height which

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always is when the convexity of the right lobe is the seat of disease; and the liver cannot so often be felt projecting from under the ribs in the former case, as it is in the latter. The distension in the former case, now under consideration, takes place in the direction of the stomach, which, when empty, gives way to it. There is always much disorder of the functions of this viscus, with sense of oppression, &c., especially after matters are received into it; and if abscess forms near the concave surface of the liver, there are often singultus, rejection of the contents of the stomach without effort, difficulty of deglutition, &c.

* In some instances I have seen the skin turn quite dark—not exactly black, but nearly approaching to it.

seemed incompatible with the duration of life, death having been produced by some other organic lesion; whilst those who have died from disease of this viscus having advanced to its utmost limits, and produced its usual consequences, show us what these derangements actually are. It is very seldom indeed, that the pathologist has an opportunity of observing inflammation of the liver in its earlier stages, unless in those cases of fever or dysentery, in which hepatic disease had supervened during their advanced stages, and which had terminated fatally in consequence of organic lesion induced in some other viscus. In these cases, however, he will not unfrequently observe the usual appearances indicating inflammatory action of some part of the surface, or of the internal structure of the liver, and occasionally he will remark them, either throughout the whole of these situations, or confined to a single lobe. The surface of the organ in the inflamed part is generally more vascular than usual, of a bright red or reddish-brown colour. Sometimes it is covered with a gelatinous coating of lymph; at other times by one much more consistent, which glues the inflamed surface to the contiguous parts. When this coating is removed, the surface of the organ underneath is of a deeper colour, more vascular than natural, and a little thickened. The substance of the liver immediately subjacent is also more vascular, and gives out more blood, when cut into, than in the healthy state. The internal structure of the organ, during the early stages of its inflammatory state, is always more vascular, of a redder or brownish-red colour, and considerably more friable and softer than usual. Occasionally, however, it is firmer and denser; but this is chiefly observed in the more chronic cases of disease. In some instances, the surface of the inflamed organ is variously shaded. Sometimes, it is marked with red, brown, brick-coloured, greenish-brown, and even with almost black spots and streaks, while the internal structure is inflamed, congested with blood, much tumefied, and softer than natural. Upon making a section of the viscus with a very sharp scalpel, and after wiping with a sponge the cut surfaces, they present a lighter-coloured reticulum, or mesh, studded with red or brick-red granulæ, and the divided ends of blood-vessels and biliary ducts. Upon being torn asunder—which is generally done with more facility in the acutely inflamed state, although sometimes with more difficulty in the chronic conditions of disease—the torn surfaces exude a greater quantity of fluid blood, but still retain their minutely granulated structure, and present both a brighter and a deeper colour than in their healthy state. When abscess

forms in the substance of the organ, then the appearances become very materially and very variously altered.

Gangrene has been remarked by many writers and teachers as one of the terminations of acute inflammation of the liver: but although I have observed this disease, and made *post mortem* examinations of it, the number of which certainly has not been exceeded by any other intertropical practitioner, I have never seen a single case of gangrene of this viscus. I am, therefore, inclined to believe that the appearances which have been taken for gangrene have been merely that black, congested, and softened state of the organ which is sometimes observed in the more acute attacks of the disease supervening to congestion, or, at least, this state of the viscus having speedily run into gangrene after the death of the patient; and therefore, if gangrene had actually existed at the time of dissection, it is to be considered as a consequence of death, rather than as a termination of the disease.

Inflammation of the liver, commencing in, or extending to the surfaces, generally gives rise to the adhesions of adjoining parts, and to the extension of morbid action to them. Hence it is, whether the inflammation has terminated in abscess or not, that adhesions to the diaphragm, and extension of the disease to the pleura and lungs, have supervened,—that the biliary ducts, gall-bladder, stomach, and duodenum, have presented appearances of inflammation, of which the concave surface of the liver seemed to be the centre or original seat, these parts being glued to it by means of coagulable lymph,—that the right kidney and right flexure, and the transverse arch of the colon, have been seen adhering to the edge of the liver, and the omentum been found collected beneath the colon, inflammatory action having thus extended itself to various parts of the peritoneal coverings. Sometimes, in addition to these marks of acute inflammatory action in the liver, and proceeding thence to adjoining parts, the liver has been found tumid, congested, and its ducts loaded with dark, inspissated bile. This state has been often remarked, without any obstruction of the common or hepatic ducts; and frequently, also, it has been connected with very considerable narrowing and almost with perfect occlusion of them,—most frequently of either the cystic or the common duct. More rarely may be remarked the common and hepatic ducts, and often the cystic duct, reduced to a simple chord*, without the smallest semblance of a canal, and the

* The cystic duct is often found in this state; the hepatic duct is sometimes seen similarly changed; but the common duct is rarely found so diseased in

gall-bladder filled with a great quantity of dark green, inspissated bile. The constriction of the ducts is evidently, in some cases, the result of spasm; in others, of organic change, proceeding from previously existing inflammation. In addition to these appearances, to the production of which the morbid functions and circulation of the liver had doubtless been most conducive, I have noticed considerable inflammatory disorder of the pancreas and duodenum, with tumefaction of the former, and of the mucous coat of the latter, sometimes completely occluding the opening of the common duct. The other morbid appearances sometimes met with in dissections of hepatic diseases, from their being generally more intimately related with abscess of the liver, and with dysentery, will be noticed hereafter.

There is one subject to which I wish particularly to direct the attention of the practitioner in his endeavours to ascertain the nature and seat of hepatic diseases,—and this is, an attentive manual and ocular examination of the region of the liver. Even in obvious cases, this means of information should not be neglected, as the

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warm climates. When, however, both cystic and hepatic ducts are constricted by spasm, or obstructed by inflammation or any other cause, it may be reasonably supposed that some degree of similar morbid action extends itself to the common duct, or when the common is thus diseased, the cystic and hepatic ducts partake, in some degree, of the derangement. From the evidence, however, which is furnished by the phenomena of disease, as well as from the appearances observed upon dissection, it seems fair to conclude that the cystic duct is often contracted, obstructed, or similarly disordered, when the hepatic and even the common ducts are not materially deranged; hence the hepatic bile readily reaches the duodenum, and the stools afford appearances of its presence, while the flow of the cystic bile is entirely obstructed; and practitioners who do not advert to this circumstance, but too readily infer that the biliary apparatus is free from disease, because yellow or hepatic bile is seen in the stools. The liver itself may be free from disease, yet the bile may not be of that quality requisite to act upon the chyme, to preserve health, or to remove disorder of the alimentary canal. We often observe pale yellow or straw-coloured motions where we have reason to infer that the flow of bile directly from the hepatic ducts is impeded; and yet the body wastes, the tone of the bowels is diminished, and looseness or diarrhœa is present. In such cases there is often evidence of obstruction of the cystic duct, or of accumulation of bile in the gall-bladder; and a healthy state of function is seldom brought about until this disorder is removed. I have, therefore, often thought that the due admixture of cystic bile is essential to the healthy performance of the digestive and assimilating functions, and that, although the recent hepatic bile may have its peculiar qualities and influence, the changes which this secretion undergoes in the gall-bladder are requisite to a healthy state of the alimentary canal.

experienced observer may derive more information from this source than from any other, both as to the extent and progress of the disease. In cases where the inflammation has gone on to abscess, this mode of investigation is quite indispensable. It is very justly remarked by Sir George Ballingall, in his valuable work on the diseases of India, that this manner of investigation gives us but little information in the earlier stages of hepatic diseases; yet, it should not even then be neglected. Information, even of a negative kind, is at all times requisite in the disorders of the liver, and more particularly in those which are most acute. Manual examination should be resorted to on every occasion; and the trunk of the body should, in all cases, be exposed to the view of the practitioner, in order to ascertain if fulness or bulging exist in any part of the hypochondrium or in its vicinity. When making manual examination, one hand of the practitioner should be pressed gently upon the part between the base of the right shoulder-blade and the spine, whilst with the other he endeavours with tact and delicacy to detect tenderness, fulness, or distension, either beneath the right false ribs, at the epigastric region, to the left of this region, or between the right hypochondrium and umbilicus. The state of the intercostal spaces should also be examined on the right side; and if pain be complained of in any of these situations, its nature may be inquired into by careful and varied pressure, whilst counter-pressure is being made on the back, in the place pointed out. The patient ought also to be made to breathe fully at the time when this examination is going forward, and he may be directed to bend, or move his body in various directions. If fulness, tumefaction, or distinct tumour, be felt, the practitioner should endeavour to ascertain their nature by gentle and varied pressure with the points of the fingers; and the existence of tenderness, the degree of tenderness, the depth at which it seems to be seated, and the presence of fluctuation, whether obscure or palpable, ought to be inquired into with as much dexterity as the practitioner can command.

Causes of Inflammation of the Liver.—The causes, which predispose the liver to inflammation, may be briefly enumerated as follows: — full living, particularly upon animal food, the use of highly-seasoned dishes, and of too little vegetable diet; too great indulgence of appetite, and living on a variety of dishes; the continued operation of a high temperature combined with moisture and malaria; a neglected state of the bowels; indolence and insufficient exercise; the habitual use of vinous, fermented, or spirituous liquors; exposure to the sun; the sanguine,

sanguineo-melancholic, and irritable temperaments, and scrofulous diathesis; a plethoric habit of body; the use of impure water; a dyspeptic state of the stomach; the depressing passions of the mind; the functional disorders of the liver, already described; attacks of fever, particularly of intermittents and remittents; dysentery and diarrhœa; and a state of irritation long kept up in the mucous surface of the alimentary canal, &c. These, while they dispose the organ to inflammatory action, upon the supervention of the direct and efficient causes, are also, more particularly some of them, occasionally the only sources to which hepatitis, in its various degrees of activity, can be traced. More frequently, however, these causes, when acting singly, are insufficient of themselves to produce inflammation, although they may dispose to it; but when two or more of them are combined, their influence is more certain, and after they have continued for some time to act upon the system, the operation of the usual exciting causes is soon followed by its full effect.

Amongst the various influences which more directly occasion the supervention of inflammatory action in the liver, there are few more energetic than the immoderate addiction to the use of spirituous liquors; and the intoxicating drinks which may be so readily obtained by the European soldier in every part of India; exposure to cold or wet when the body is over-heated; draughts of cold fluids when the surface is perspiring; fits of anger or passion; great chagrin, disappointment, and severe grief; injuries received in the vicinity of the organ, or sudden and great exertions of strength; blows or injuries on the head; exposure to a hot sun, and afterwards to the night dews and malaria; great repletions after long fasting; violent exercise; the retropulsion of cutaneous eruptions; the imprudent use of the cold or shower bath; and the neglect of the functions of the bowels. These causes, when acting singly, may not always give rise to the disease, unless the organ has been disposed to undergo it, by the continued influence of one or more of the predisposing causes; and we may often trace the operation of two or more of the occasional or exciting causes in the production of the morbid action. Thus the mental emotions already alluded to, may participate with exposure to the sun, to night dews, or to any other of the exciting causes, in the production of the disease to which the organ had been disposed by the combined action of another set of influences. And even the exciting or occasional causes, when present in great force, and acting in conjunction, may occasion the malady, without the existence of any predisposing influence

which could have assisted their action, further than the more universally prevalent one of a very high range of a temperature, combined with a moist state of atmosphere and terrestrial exhalations.

Sect. II.—*On Chronic Inflammation of the Liver, and Organic Diseases of the Organ.*

Chronic inflammation may supervene primarily, or the acute forms of the disease may have been so far subdued as to subside into a slow, inactive state. When chronic inflammation takes place primarily, it is generally seated in the internal texture of the organ, and often gives rise to but few local symptoms, and but little constitutional disturbance. But chronic is a term which conveys with it no precise idea, and merely signifies a slow state of inflammatory disorder, presenting every grade, from that state of disease which may be considered as only slightly deviating from the healthy action, and which may continue for a length of time, giving rise to various organic changes. When this form of inflammation remains after the more acute phenomena have been subdued, it is usually seated in the substance of the liver, but not uniformly, as it may be seated in the surfaces; and it should also be recollected, that, although chronic inflammation of the liver may follow upon an acute attack, the latter may also supervene to the former, and actually does so on many occasions, particularly when the patients have been exposed to energetic exciting causes, or to an injudicious regimen and treatment. This should be kept in mind during the treatment of both acute and chronic forms of inflammation of the liver; for it should be an object of importance with the practitioner to prevent active inflammation from degenerating into chronic, and the chronic from being converted into active disease.

Chronic inflammation of the liver usually commences, and is accompanied, with much disorder of its functions. There are appearances of either disordered biliary secretion, or obstruction to the discharge of this fluid into the duodenum. The bile is seldom in due quantity; or, if its quantity be not materially diminished, it is mostly changed from its healthy state. Torpor of the organ, when it accompanies a state of chronic disease of the viscus, may also lead occasionally to attacks of more acute disorder, attended with an increased and vitiated secretion of this fluid; and this effect may proceed from the elements of bile accumulated in the blood, owing to the deficient function of the liver, irritating or exciting it to increased or morbid action. The secretion of bile may, therefore, be various in quantity, according to the particular circumstances

of the case; but it is more generally diminished, and almost always somewhat changed in quality, as far as may be judged from the appearance of the motions and its influence upon the chyme, as shown in the digestive and assimilative functions.

As chronic disease of the liver may present every grade of activity, down from active inflammation of the viscus to the slightest deviation from a healthy function, which may be followed by organic change of the organ,—so the symptoms indicating its existence must vary in severity in particular cases, and assume more or less distinctive characters. When the internal structure of the viscus is the seat of the vascular disorder, and if this be of a slight and inactive character, then the symptoms will be often so slight as not to engage attention until important organic changes may have taken place in the organ, and the concomitant symptoms, such as wasting of the body, with disorder of the digestive organs, lowness of spirits, &c. If the surfaces of the liver become at all involved in the disease, the symptoms are then of a more distinct and acute character.

In the severer cases of chronic inflammation of the liver, the symptoms will be nearly resembling those already described as characterising the more active forms of the disease, only much less acute. The nature, and pathological relations, of the symptoms are, however, the same; they only differ in degree. They also, in some instances, may be correctly considered as indicating the part of the organ diseased; but in the chronic forms of hepatitis, the relations of the symptoms to particular textures or parts of the biliary apparatus are only to be partially relied upon, and are to be distrusted in proportion as the signs become less acute and less distinctly marked.

In the slightest and most chronic forms of inflammatory action of the biliary organs, the symptoms are often indistinct; and it is chiefly in cases of this description, by means of disorder of the digestive and assimilative functions, that we are led, in many instances, to infer the existence of disease of the liver. The loss of flesh, the dyspeptic symptoms, particularly the slow and painful digestion, accompanied with acid and acrid eructations, flatulency, nausea, and sometimes vomiting, torpid state of the bowels, or dark-coloured, offensive, slimy, greenish-coloured, tenacious, or watery and muddy motions; the frequent calls to stool, and the scanty and morbid state of the evacuations; the dark-coloured and disordered condition of the urine; the distension and oppression of the epigastrium and right hypochondrium; the occasional aching

pain and weight in these situations; the uneasiness and pain about the right shoulder or shoulder-blade; the slight acceleration of the pulse towards evening, with an irritable beat, and considerable heat and restlessness through the night; the burning heat of the palms of the hands and soles of the feet in the evening, and chilliness in the morning; the white, foul, and excited tongue; the bitter or disagreeable taste of the mouth; the hardened state of the gums; the sallow appearance of the countenance, and either yellow or pearly-white colour of the eye; the sickly and leucophlegmatic character of the body generally; and the elevation of the shoulders, —are the principal symptoms by which we are to be guided in determining the existence of chronic inflammation of the internal structure of the liver.

When the surfaces are the seat of disease, the pain is generally then more marked, and as the superior or the inferior surface is chiefly affected, so will more or less disorder be referred to the chest in the one case, or to the stomach and bowels in the other. When the superior and exterior part of the right lobe is the seat of disease, then the patient reclines with most ease on the right side, and feels more or less acute pain, or a dragging sensation, upon turning to the left; but when this sensation is felt, we may generally infer the existence of adhesions between the lobe of the liver and the right side. The back is generally the easiest position to recline upon, and a slightly bent posture is often preferred.

In every case of disorder referrible to the liver, careful examination of the region of the organ should be made, both by the hand and the eye. But in no case should the examination be made roughly, or in such a manner as to excite any pain. It should be recollected, that the liver, when inflamed or congested, is often also softened in its texture, and more liable to suffer from a rough mode of examination. I have known cases wherein much increase of suffering was occasioned by it, and wherein chronic and sub-acute attacks of disease were converted by it into active inflammation. More precise knowledge will be generally obtained when the examination is made gently and carefully, than when it is made otherwise. We should also take care, when endeavouring to obtain information in this way, that we satisfy our minds distinctly respecting the existence of tumefaction or distinct tumour, or the absence of either. In chronic inflammation of this organ there is generally much loss of flesh; enlargements of the organ, or distinct tumours from abscesses may then be distinctly felt, and many of their relations with the adjoining parts may sometimes even be

detected. This is the case chiefly when tumefaction or abscess takes place on the superior and exterior surface of the liver, or near its anterior edge. When organic changes of the above description are situated in the centre of the liver, or at its superior and posterior aspects, then little more can be detected than tumefaction and fulness in the right hypochondrium and epigastrium, with a descent of the edge of the organ considerably beneath the margin of the ribs. When these changes are situated towards the inferior and posterior surface, then there is neither much fulness nor tumour in the above situations, even when tumour and enlargement actually exist. The stomach and colon give way before tumours or abscesses pointing in this direction; and thus tumefaction is seldom present, and if it be, it is usually of a diffused and undefinable kind. In such cases there is usually much oppression and sense of load at the pit of the stomach, particularly after a meal, with urgent symptoms of dyspepsia, and acrid, acid, and flatulent eructations, sometimes with vomiting, or rejection of the contents of the stomach, sometimes without much retching or exertion, and a disordered state of the biliary organs, with irregularity of the bowels and morbid condition of the stools.

The terminations of chronic inflammation of the liver are various. The greater number of them, however, may be viewed in the light of advanced stages of the inflammatory state; others merely as organic changes to which this state invariably leads in particular habits and constitutions, rather than as actual terminations of chronic inflammatory action, since the vascular disorder may be considered as still existing. As in the more acute forms of disease, those now under consideration may terminate in resolution by a gradual diminution of the morbid symptoms, and a return of the healthy actions of the diseased organ, and of those related to it in function. They may also give rise to a more acute form of disease, or to organic changes of a serious and even fatal tendency. Amongst the former are, active inflammation of the organ, or of the gall-bladder and ducts, and dysentery. The latter embraces all the organic changes to which the organ is liable. These are not generally so varied in warm climates as in temperate countries. The chief organic changes met with in the East, consequent upon inflammation of the liver of a more or less chronic kind, are the following:—

Collections of matter formed in the substance of the organ consequent upon chronic inflammatory action, as well as from the more active state of disease. When the purulent matter is collected

into one large abscess, it usually approaches the appearance of abscess consequent upon active inflammation. Not unfrequently, however, very minute abscesses are scattered through the substance of the liver, both with and without the appearance of a distinct cyst the matter collected being of a firm or cheesy consistence, and yellowish white colour. Sometimes this consistent kind of matter does not fill completely the cavity containing it: it seems as if the watery portions of the matter had been removed by absorption, and thus the more consistent part fills imperfectly the cavities in which it is contained. The substance of the organ intervening between the purulent deposits is sometimes more vascular than usual, and of a brick-red colour; and at other times not materially changed from the healthy colour and consistence.

The liver, in many instances of long-continued and slight inflammatory action, becomes much enlarged, particularly its right lobe. This appears to arise from the deposit of lymph in the interstices of the structure, which deposit becomes dense, and closely resembles an organised substance, most probably from the absorption of its watery portions. The enlargement is often accompanied also with deposits of purulent matter in various parts of the organ, with a friable state of its texture, and a dark-coloured and congested condition of both its internal structure and surfaces: the latter are generally much darker than natural, and often variegated with lighter streaks and small spots.

When the deposition of lymph in the structure of the liver is attended with greater density of its organization, either partially or generally, the change has been ascribed to a specific organic change; and a true scirrhous condition of the organ has been considered as the result. This state seems to be merely the consequence of very slow inflammatory action, with a deposit of organised matter, and an increased consistence of the reticulated or cellular parenchyma of the viscus, and frequently with an effusion of lymph in the granulated tissue composing the greater portion of its internal structure. It seems to me also, that the consistence of the organ met with in cases of chronic disease characterised by enlargement, is more the consequence of the activity of the inflammatory action from which it proceeds, and the habit and constitution of the patient, than any other cause; the organ being more friable and congested, the more acute the previously existing disease,—and more firm and more closely resembling a true scirrhous and semi-cartilaginous state, the more chronic or slow the inflammatory action which had existed.

Tubercles of various kinds,—some apparently encysted, others without any evident cyst or distinct envelop, and, when divided, presenting either a concentric or radiated texture, varying in consistence from a gristly or cartilaginous state to one of semi-fluidity, occasionally filling completely the cavities in which they are contained, particularly when they approach a state of fluidity, and at other times, when their consistence is greatest, leaving vacuities between their circumference and the parts of the liver surrounding them,—are often severally detected in examinations of the more chronic forms of hepatic inflammation. In many cases, the substance of the liver containing these tubercular formations presents little or no evidence of much inflammatory action having existed, at least recently, in the organ. The tuberculated liver is often also enlarged, and occasionally it is much firmer in its texture than usual. When signs of co-existent inflammation of the internal structure are present, there is frequently also greater friability; but this is not uniformly the case. Sometimes the substance of the viscus presents a gristly or cartilaginous appearance, and is lacerated with greater difficulty than usual. Such appearances are chiefly remarked in the most chronic cases.

In these cases also, more particularly in those addicted to the use of spirituous and intoxicating liquors, the substance of the liver is obscurely tuberculated, of a cheesy consistence and texture, and of a deep nankeen-like colour: it is generally, at the same time, more or less enlarged. In many chronic cases of diseased liver, arising from the above cause, the internal structure of the organ is of a par-boiled and scabrous appearance, drier and more spongy than natural, and, when divided by a scalpel, or torn asunder, presenting a more or less pale colour, and great inequality of consistence, small rough eminences being surrounded by soft, greyish, and spongy matter. In some of these cases, the substance of the viscus is of a greyish-brown colour. Conjoined with this condition, the size of the liver is often diminished, its vessels nearly without blood, the hepatic ducts devoid of bile, and the gall-bladder either empty or containing a small quantity of a pale, straw-coloured, watery fluid, scarcely resembling bile. This state of the hepatic vessels, biliary ducts, and gall-bladder, is often also conjoined with scirrhous enlargements, tuberculous disease, with atrophy, and with many of the other very chronic states of the liver now described.

When the liver, owing to very slow and long-continued inflammatory action, has become tuberculated, or enlarged with scirrhous hardening, then it may generally be felt projecting from under the

margins of the ribs, particularly on the right side. But these forms of organic change are less frequently observed in India than in Europe. The functions of the liver, in cases of tubercular disease, of scirrhous enlargement or hardening of the viscus, and of the other organic changes now described, are always very seriously disordered. There are present a diminished secretion of bile, with change from its healthy state; much disorder of the digestive and assimilating functions; wasting of the body; drowsiness and pain over the eyes; a disagreeable taste of the mouth; unhealthy appearance of countenance; an irregular condition of the bowels, with a pale, morbid, and offensive state of the motions; high-coloured or brown urine; frequently a yeasty, whitish, and clayey condition of the stools; and slight acceleration of the pulse towards evening, with heat and dryness of the palms of the hands, and many of the symptoms formerly enumerated.

In many very chronic cases, the liver becomes smaller than natural; and in some it is very much diminished in size. Such cases cannot often be detected during the life of the patient, otherwise than by the obstinate torpor of the biliary functions, the deficiency of bile in the stools, and the sunk state of the epigastrium and margin of the false ribs, when the patient is examined in a reclining position. Atrophy of the liver may be the consequence of slow inflammatory action; but on this point it is difficult to decide: even although it may evidently result from this source in some cases, it cannot be inferred that it does so always. I have, however, met with several cases in which the wasted state of the organ was attended with a marked cicatrix on its surface, and extending through the greater part of the whole thickness of its substance. In such instances the cause of the diminished size of the organ was manifest; and the evidence of abscess having existed in it many years before was complete. In one case, several cicatrices of the liver accompanied this state of atrophy, and gave the surface of the organ a singularly radiated appearance.

The appearances, then, which are met with on dissection of cases of chronic inflammation of the liver, and which may be considered amongst the terminations and consequences of the more chronic forms of inflammatory disease, are abscess, and small collections of matter; tubercles; enlargement of the organ and softening of its texture; increased density and scirrhous enlargements and tumours; enlargement with friability, or with cartilaginous hardening of its structure; a rough, pale, and parboiled-like appearance; a cheesy tuberculated state of its structure; a spongy and less vascular

condition of its internal texture; atrophy, with or without the marks of cicatrices; various colorations of its surface or substance; and adhesions of various kinds to adjoining parts. The above organic changes are very frequently met with in fatal cases of dysentery, particularly that form of the disease which is called hepatic dysentery, and in bilious remittent fevers and obstinate intermittents. Indeed, they are more often observed, in India, thus complicated than as simple diseases of the biliary organs, and generally they are variously conjoined the one with the other.

In addition to these organic changes, which are to be referred chiefly to the substance of the liver, there are others which belong more especially to the gall-ducts. These are collections of very viscid and thickened bile in the hepatic ducts; and biliary calculi in the same situations. I have seldom observed, however, biliary calculi lodged in the hepatic ducts. It is very probable, that, when they form in this situation, they become a source of irritation and, acting as a foreign substance, produce inflammatory action, which soon terminates in abscess. Biliary calculi frequently form, in warm climates, in the gall-bladder, and often produce inflammatory action, in this receptacle, or in the cystic or common duct, not unfrequently attended with spasm, which often extends to adjoining organs.

The symptoms indicating inflammatory action of the gall-bladder or ducts cannot always be distinguished from those accompanying inflammation of the concave surface of the liver;—the same irritability of the stomach and irritable beat of the pulse, pain at the pit of the stomach, and disordered state of the bowels, accompany both the one and the other. When, however, the ducts and gall-bladder are inflamed, there is, more generally, a marked deficiency of the biliary secretion, or an entire absence of it from the stools, and jaundice is more constantly present. Frequently also, and particularly if the inflammatory action be attended with spasm, or arise from the irritation of biliary calculi, there is an irregular action of the diaphragm, sometimes hiccup, and occasionally short paroxysms of dyspnœa.

When inflammation attacks the pancreas, it not unfrequently extends to the common duct, occasioning occlusion of its canal, and enlargement of the pancreas itself. When this is the case, jaundice becomes complete, and the patient generally sinks under the disorder of the biliary and pancreatic apparatus, and the imperfect state of the assimilating process; marked disease generally supervening also in the small and large intestines, from the absence

of bile, and the insufficient changes produced upon matters taken into the stomach in the course of their passage along the alimentary canal.

When inflammation commences in the duodenum and extends to the ducts, the symptoms very closely resemble those already noticed as characterising inflammation of the concave surface of the right lobe of the liver; and there generally is present, in addition, considerable pain in the region of the duodenum, proceeding from beneath the right scapula to the right hypochondrium, with a sense of dragging or drawing together of the parts in the vicinity. Owing to the tumid state of the mucous tissue accompanying the inflamed state, and particularly if the inflammatory action extend to the common duct, the opening of this duct into the duodenum will be considerably obstructed, if not entirely occluded, and jaundice will thus supervene as a necessary consequence. Inflammation of the duodenum extending to the ducts, is, moreover, attended with sickness at stomach and vomiting, which generally come on about two or three hours after a meal, and with a relaxed or irregular state of the bowels, and a light, cream-coloured, and frothy state of the motions.

Jaundice can scarcely be considered in any other light than in that of a symptom of a functional or an organic disease affecting some part of the biliary apparatus. It varies in degree from a slight yellowness to a deep green, or even olive colour; the latter of which has been commonly called black jaundice, and is comparatively rarely met with. A slight form of jaundice is often seen accompanying bilious inflammatory fever and bilious remittents; but in such cases this symptom seems to arise rather from an increased secretion of bile than from any obstruction to its discharge into the duodenum. It may also arise from the absorption of bile and morbid secretions from the internal surface of the alimentary canal, especially when active purging has not been instituted sufficiently early in the disease.

It is unnecessary to add any thing respecting the causes of chronic inflammation of the liver, in addition to what has been already stated respecting the causes of the more active forms of the disease. When chronic inflammation supervenes primarily, it generally springs from the sources already pointed out, and is more frequently met with in the nervous and melancholic temperaments, and as a sequela of long-continued disorder of the digestive organs, particularly of the stomach and large intestines. It is also frequently found as a consequence of more active disease, and of organic

changes produced in some part of the biliary apparatus. Morbid states of the functions of the liver, and of the constitution of the bile itself, owing to the continued irritation thereby kept up, are also conducive to slow inflammatory action in the substance of the organ; chronic inflammation frequently thus originating, as the more active inflammation often does, in functional derangements, and in congestion of the viscus. Indeed, on many occasions, such derangements not only introduce the inflammatory state, but also accompany it in a more or less marked manner during its progress, and even often continue for some time after its decline.

Those cases of hepatitis which differ from the more acute forms of the disease merely in degree, becoming on this account only more chronic or slow than those already detailed, require no further illustration. They seldom terminate otherwise than favourably, when treated with judgment and decision; and when they end unfavourably, it is generally by inducing organic change, either in the biliary organs or in the large bowels, owing to the morbid condition of the biliary and intestinal secretions.

Sect. III.—*On Abscess of the Liver.*

When inflammation of the liver, especially of its internal structure, is not treated with sufficient decision in its early stages, the formation of one or more abscesses is a very frequent consequence. Abscess is very frequently a consequence of the forms of inflammation of the liver, which are, as already shown, of a more or less active nature, although often not manifested by many acute or painful symptoms. It also supervenes to inflammatory action of a less questionably chronic form; and it often follows upon that state of increased vascular action of the substance of the organ which seems to be intermediate to acute and chronic disease. When suppuration takes place, there is either something favourable to its supervention in the state of constitution or diathesis of the individual, or in the vascular condition of the organ, or in the concurrent circumstances and phenomena of the case. In illustration of this position, it may be observed, that the sanguine and scrofulous habits are particularly liable to this termination of hepatic inflammation;—that it may be dreaded by the practitioner, when he finds, upon examination, considerable tumefaction of the organ accompanying the early stages of the disease;—and that it frequently supervenes to the insidious inflammation of the substance of the liver, which often accompanies, if it does not actually occa-

sion, a particular variety of dysentery, and which, although not generally manifested by acute symptoms referrible to the region of this organ, is not the less active as respects its progress and termination. Indeed, in many instances, the practitioner in India will find, when the early stage of inflammation of the liver is accompanied with much fever, a heavy aching pain, and great tumefaction in the region of the organ, that it is very difficult to prevent the supervention of suppuration even by the most prompt and copious depletions, and by the most active employment of mercurial remedies. It frequently happens also that considerable enlargement of the liver is observed as a sequela of active disease of the viscus, even although much decision may have been evinced in the treatment, and the most urgent symptoms have been subdued. But, in such cases, enlargement of the organ is the result of some degree of effusion of lymph in the interstices of the inflamed tissue, and denotes a similar state of parts to that marking the previous existence of inflammatory action in more superficial and more tangible glands. Indeed, inflammation of the liver, especially of its internal structure, may be considered as resembling that of any other glandular body: when inflamed, it is generally tumid; and this tumidity arises from similar causes, in conjunction frequently with congestion of blood in the portal and hepatic veins, and accumulations of bile in the ducts. As in other glandular parts also, and in the cellular tissue especially, so is there a disposition inherent in tumefaction of the liver to terminate in abscess, in proportion to the extent to which it is present, and the powers of the constitution impaired; and even when this particular state is so far subdued as to prevent the accession of this unfavourable consequence of vascular disorder, it will still remain to a considerable extent, owing to the effusion of lymph in the affected part. It is owing to this circumstance that tumefaction, with evident soreness of the organ upon pressure, is so often remarked during the decline of the disease; and it is chiefly in promoting the quick removal of this effect of the morbid vascular action, that a short mercurial course is so beneficial in the treatment of hepatitis after depletions have been sufficiently practised. When tumefaction remains for any time as a consequence of inflammation, or when inefficient means are made use of in order to remove it, or when the patient is exposed to hurtful influences and causes, and allowed to indulge in stimulants, or to experience mental or physical excitants, before it be entirely removed, and the functions of the bowels restored to the healthy state, it becomes the centre of vascular disorder, in

which abscess rapidly supervenes, owing to the predisposition of the vessels of the part to undergo the suppurative process derived from their previous state of disease.

In cases of this description, and in debilitated individuals of a scrofulous diathesis and sanguine temperament, abscess very frequently forms both suddenly and unexpectedly, and often without any very prominent symptoms preceding or marking its supervention. In the strong, plethoric, and unimpaired constitution, the inflammatory action preceding suppuration is generally active, and productive of more or less symptomatic fever, and local signs, by means of which approaching mischief may be suspected and guarded against.

It has been stated in a former part of this work, that there may exist two states of congestion of the liver, the one differing very much from the other; namely, congestion of the portal system of vessels and of the hepatic veins, and engorgement of bile in the hepatic ducts. These, although often existing separately, frequently also are present at the same time, and are not uncommonly, either collectively or individually, connected with accumulation of bile in the gall-bladder. This state often produces great disturbance of the system, according to the degree in which it exists, and the constitutional peculiarities of the patient, and often induces inflammatory action, with great tendency to the suppurative process; this tendency being in proportion to the degree of congestion of the vessels, and consequent tumefaction of the organ. When the habit and constitution of the patient are unimpaired, and the vital energy of the organ has not been overpowered, the congestive state above enumerated is generally relieved by means of a healthy reaction of the circulation of the organ, and a free secretion of bile; and if the reaction thus induced should run to inflammation, it will readily subside under a depletory plan of cure, and the functions and circulation of the organ return to their healthy condition, but when, owing either to a scrofulous diathesis, deficient tone of the organ, or obstruction to a free circulation in any part of the viscus, or irritation of its vessels in a particular part, or impediment in the way of a free discharge of bile into the duodenum, great tumefaction of the organ supervenes to, or accompanies, the inflammatory state, the formation of one or more abscesses is much to be dreaded; and when tumefaction of the organ is detected, the most active means are required to prevent this consequence, although they cannot always succeed in averting it. Thus it will be seen, that the supervention of abscess of the liver will depend much upon the

peculiar constitution of the patient, and pathological state of the organ, both previously to, and during the inflammatory process; and, indeed, these circumstances will more readily induce the suppurative process than the activity of the pre-existing inflammation.

When the inflammatory action is very acute, and accompanied with the congested state of the organ so often alluded to, abscess then rapidly forms, if the disease be not arrested; but its formation is preceded by signs which ought to lead the practitioner to the adoption of measures which seldom fail of preventing its supervention. It is chiefly owing to some fault in the state of the viscus and constitution of the individual, that it takes place during acute and well-defined hepatitis. Although plethoric and robust young men are very subject to attacks of active hepatitis, characterised by the more acute signs already described; yet, under a judicious and decided plan of cure, abscess very seldom occurs amongst them. But it is chiefly in the more insidious cases of inflammation of the substance of the organ, when the symptoms are but ill defined, and by no means acute, that the supervention of abscess is to be dreaded. Such cases are commonly met with amongst the fair-complexioned, the scrofulous, the relaxed and leucophlegmatic, the enervated, those subject to bowel-complaints, and the sedentary. In such individuals there is often little or no appearance of existing inflammatory action, and the symptoms complained of are often equivocal. In them also, even where inflammation is most evident, it assumes the chronic or even the passive form: there is often no definite sign which will guide the judgment of the practitioner that abscess is forming, although experience will enable him to decide upon the existence of disease of the liver. In cases of this description, patients often neglect themselves, until it is too late to prevent the termination in abscess, if, indeed, abscess be not already formed; and when they come under medical care, some consecutive disease may have made its appearance,—such as dysentery and chronic diarrhœa, which may mask the primary malady, and engage the whole attention of both patient and physician.

Abscess of the liver may be regarded in the same light as abscess of any other part of the body, and the same changes take place in its formation. It is well known that collections of matter sometimes form in external parts of the body without any marked rigors or constitutional disturbance, and even without much fever; and a similar occurrence may supervene with respect to the liver. The symptoms which usher in the formation of abscess in many instances seem to depend more upon the habit and constitution of the indi-

vidual, or the magnitude and extent of mischief at the period that the suppurative process is beginning, than upon any invariable change in the system necessary to its commencement, and regularly indicated by certain signs. When the inflammatory action going on in an organ or part is not very acute, and is not attended with great general excitement or high symptomatic fever, and when the constitution is characterised by a scrofulous or tuberculous tendency, then abscess may, and indeed does, supervene in the liver without giving any precise warning, until the very last stage of the suppurative process, when the aggregate of the symptoms may lead us to infer its existence, or its communication with some other viscus renders it manifest. When, on the other hand, the inflammatory action has been acute, the powers of life not materially overwhelmed, and the diathesis and habit of the individual not much in fault, the commencement and progress of abscess of the liver may frequently be detected by the observing practitioner, if his inquiries into symptoms be made with sufficient precision, and understood by the patient. On some occasions, however, symptoms having a stricter reference to the functions and site of the liver, may be so masked from the observation of the practitioner, by some concurrent or consecutive disease, as to mislead his judgment altogether. But in proportion as attention is directed to the subject, and experience respecting it ripens, so will such error very rarely occur.

When the liver is actively inflamed, it often becomes exceedingly large, from previously existing or concomitant congestion; and sometimes it fills the greater part of the superior abdomen, projecting considerably from under the ribs. This is more particularly the case when the superior surface of the liver is the seat of the disease. When the increase of bulk is chiefly in the concave surface of the liver, it extends more in the direction of the stomach and colon, and is less evident upon examination. Adhesions are then frequently formed with either the stomach, colon, small intestines, or right kidney; and if the inflammation terminate in suppuration, the abscess generally breaks in some one of these viscera, or even into more than one of them. When the liver becomes enlarged and congested with blood, at the same time that it is inflamed, although the danger of supervening abscess is greatly heightened, yet the enlargement and tumefaction evident in such cases upon examination, are no sign that the abscess already exists, or even that the suppurative process has actually commenced: on the contrary, when abscess actually forms, the diffused tumefaction

diminishes, it becomes more concentrated and limited; and at last, unless in the very seat of the tumour, the liver seems, upon examination with the hand, actually lessened in size.

Adhesions to opposite surfaces, it must be remarked, are not always the result of the pointing of an abscess in any particular direction. If it form, and point in the superior and anterior surface of the liver, adhesions to the adjoining parietes frequently are the consequence, and then an operation may be performed with a prospect of advantage in many cases. But it may point in various other directions, and break into the large cavities, or into other viscera, according as adhesions may or may not have formed. When the disease is seated in the superior and anterior part of the organ, with tumefaction, the progress of the suppurative process, and the ripening of the abscess for the operation, may then be very closely and accurately observed. But when tumefaction and subsequent abscess take place in the superior and posterior part of the viscus, or in the concave surface, then the extent and progress of disorganisation can but seldom be accurately followed; and we have no precise information as to the extent of mischief, unless the collection of matter find its way into the lungs, on the one side, or into some part of the abdominal viscera, on the other.

When abscess points externally, the circumstance may readily be detected; and in some cases, when it is formed in the body of the liver, and points in the direction of some other important organ, it may be so recognised by the symptoms present, and even, in some few cases, by means of the hand; counter-pressure on the posterior parts of the lower ribs being made at the time of examination. It should, however, be recollected, that abscess may form and point either upon the diaphragm or upon the abdominal viscera, in broken-down constitutions, phlegmatic temperaments, and scrofulous habits, without any evident symptoms being present by which we may judge either of its progress and course, or even of its existence: indeed, in such individual circumstances, unless the disease assumes a very active character, the formation or existence of abscess is not often evident until it is about to terminate fatally, having induced great disorder of more than one of the digestive and assimilative functions; and in some cases, if the attention has not been alive to this consequence of disease, it may pass undetected until disclosed by the *post mortem* examination of the case.

When acute attacks of hepatitis are not subdued by sufficiently decisive treatment in their early stages, they run rapidly into abscess. This consequence of the disease is chiefly to be dreaded

when considerable enlargement of the viscus is found upon examination. If abscess actually be formed, and is seated in the convex part of the right lobe, the enlargement is evident over the whole hypochondriac region, the liver extending considerably below the ribs towards the umbilicus, and sometimes across the epigastrium to the left side. When the abscess is likely to point below the ribs, there are generally great tumefaction and increased heat of the surface of the part and its vicinity: frequently there is found a distinct enlargement, particularly in the more advanced progress of the abscess, immediately under the margin of the right ribs. If, however, abscess form on the superior surface of the liver, and point upon the diaphragm, although the enlargement of the organ will be very perceptible, yet there will seldom be felt any great increase of temperature on the surface of the hypochondrium. The abscess may point between the ribs; in this case, a bulging of the false ribs will be observed, and more than usual fulness of the intercostal spaces, and increased heat in this situation, with considerable enlargement, the liver being felt below the right hypochondriac region in the epigastrium, and sometimes in the left hypochondrium. This enlargement may exist for a considerable time before matter forms; but in this case there will be no distinct tumour nor increase of heat: when the abscess has advanced considerably to maturity, the undefined enlargement and tumefaction become even diminished, and distinct tumour is more observable, according to the situation of the abscess and the direction which it may take.

When the abscess is completely formed, and is seated in the superior and posterior part of the liver, the enlargement and tumefaction felt beneath the ribs, previous to, and during the formation of matter, become considerably diminished; but if it be in the inferior and anterior part of the organ, the enlargement becomes more and more reduced and circumscribed, until it assumes the character of a distinct tumour: and the pain which was often considerable during the period of general enlargement or tumefaction, either altogether ceases, or is now but little felt.

The supervention of abscess of the liver is often not manifested by symptoms of a decided nature, particularly when it is the consequence of a chronic inflammatory action, complicated with dysentery: in such cases especially, the formation of matter may commence and terminate without the appearance of any of those signs upon which the inexperienced are taught to rely. The presence of rigors can seldom be expected; but slight shudderings and formi-

cations are more frequently observed. Even when rigors are complained of, they are not diagnostic of the formation of matter in this disease; for the practitioner must remember, that hepatic disease is often complicated with ague, and the rigors may belong to the febrile paroxysm. Rigors may proceed also from that state of stomach induced by irritation and spasm of the gall-ducts, and by the irruption of bile into the duodenum. When rigors or horripilations supervene to the more active forms of hepatic disease, then more dependance is to be placed upon them, as characterising the formation of matter in the liver; but it is chiefly by the manner of their supervening to the antecedent symptoms, and by the relation which they bear to the phenomena succeeding them, that we should be guided in our judgment respecting them.

Sometimes an internal sense of throbbing and fluttering has been felt in the region of the liver, and has been followed by a broad, soft pulse, and night perspirations. The supervention of night perspirations, with a clamminess of the skin of the extremities, is one of the most certain signs of the formation of internal abscess which we possess: but even this ought not to be relied upon alone, but should be viewed always in connexion with the other symptoms characterising the case. The next in importance are frequent cold sweats, but these are chiefly met with in the advanced stage of abscess. Frequent fainting sensations are deserving of considerable reliance on the part of the practitioner. There are also generally much anxiety and oppression at the præcordia, and restlessness. If, during the treatment of hepatitis, we find it a matter of difficulty to affect the system with mercury, vascular depletions having been previously practised with the requisite decision, we may then dread the existence of abscess. Whether the mercurial remedies employed may act in such cases, owing to peculiarities of constitution or diathesis, in producing and accelerating the suppurative process, has been questioned. Mercurial action in this state will, in my opinion, accelerate the suppurative process; the system will not be brought under the full operation of mercury; ptyalism will not be produced; the gums, however, will be swollen, become very red and irritable, and sometimes ulceration will even be occasioned. These denote the general irritation of the system caused by this agent, which it is evident must necessarily accelerate the formation of pus.

When abscess is formed, the tongue is seldom or ever of a natural appearance. At first it is sometimes white, and the papillæ raised or excited: it afterwards becomes of a dusky, brick-coloured red-

ness, or what may be called a beef-steak tongue. At other times it is dry, coated, and of a brown tinge. In the more chronic cases, it is often smooth, chapped, lobulated, and apparently deprived of its papillæ. When great mischief is going on in the liver, without any acute symptoms, the tongue is often an excellent guide, and more to be depended upon than the pulse. In many of the less acute or chronic cases of abscess, the tongue has a peculiar white appearance, with the papillæ raised or excited: it is somewhat dry, but without any coating. This is what may be called an excited tongue, because it is a sign of great vascular excitement going forward in internal structures; and I have often ordered depletions from this symptom alone, the tongue becoming natural as soon as a full depletion was performed. Hence when this state of tongue is observed, depletions may be directed more safely than upon the indication of any other symptom. Care should, however, be had not to confound this appearance with a white and moist condition of the tongue, or with a white, yellow, or brown crusted state of this part. The pulse, at the commencement of the formation of matter, is generally soft and full, is subject to acceleration in the evening, and, as the organic change advances, becomes more irritable, quick, and contracted. The stools are always much disordered through the progress of abscess of the liver: they are generally more or less frequent, are scanty, and usually consist of a greenish watery fluid, with a greenish froth, or a green, slimy scum, floating on their surface. Frequently there are also straining and tenesmus; and some blood, with mucus, is occasionally voided. The calls to stool are also, in many cases, most frequent during the night. In hepatic disease, terminating in abscess, and complicated with dysentery, both the small and large intestines become diseased, —first, functionally, and afterwards organically; and the patient generally dies of the organic change produced chiefly in the large intestines frequently before the abscess makes its way, either externally or into any other organ. In many cases of hepatitis, complicated with dysentery, more particularly when the hepatitis presents a chronic character, the termination of the inflammation in abscess is accelerated, if it be not altogether produced, by the sudden arrest of the dysenteric disease. In many other cases, the hepatic disease is not apparent until the dysenteric symptoms are subdued; but although the disorder of the liver is not evident, or does not excite notice, while the bowel disease is urgent, we are not on that account to infer that it does not then exist. On the contrary, in most of the instances of this description, the liver is

the original seat of mischief, which only becomes more severe and more apparent when the consecutive disorder is abated.

In the more advanced stages of abscess, and particularly when it is seated in the posterior part of the liver, and presses upon the diaphragm, anxiety and oppression at the præcordia become urgent. There are often attacks of dyspnœa, and frequently hiccup. There is sometimes also much difficulty of swallowing; and when the abscess points upon the stomach, this symptom is very generally observed, and is often aggravated by the almost constant presence of flatus in the stomach. In cases where the stomach is pressed upon by an abscess, vomiting is a very general symptom; and in the far advanced state of abscess, vomiting occurs without exertion soon after substances are received into the stomach, and occasionally the matters taken are ejected through both the mouth and nose at the same moment.

The easiest position for the patient in abscess of the liver is various. It is most frequently upon the back and upon the left side, when the abscess points towards the stomach or colon. Sometimes, the patient experiences most ease from a sitting posture, and leaning gently forwards. Pain is a very uncertain symptom. At the period of tumefaction or enlargement of the organ, which in the more acute cases precedes the formation of matter, the pain is sometimes considerable, and is afterwards converted into a throbbing or beating sensation, accompanied by shooting or darting pains in various directions, as described under the section on active hepatitis. When, however, abscess is fully formed, a pricking pain is often only felt, and chiefly in the situation where the abscess is pointing. In the more chronic cases, the pain is often not much felt in the region of the liver, and this pricking sensation is the only uneasiness felt in that situation, and sometimes the only notice we receive of the existence of abscess, unless our attention has been particularly directed to the subject. In such cases, however, pain will generally be complained of on sudden motion, on quick respiration or action of the diaphragm, as in sneezing, coughing, &c.

In many of those chronic cases, the patient, even when he experiences pain, attaches but little importance to the circumstance. His countenance, however, evinces disease: it is sallow, sunk, and the eye either of a yellowish tint or of a pearly hue. His tongue is white and excited, the spirits depressed, and sometimes he is even melancholy. These symptoms may go on with but little variation for months; but the patient continues to lose flesh, the pulse is

quickened in the evening, and when he comes under treatment, the functions of the bowels are found irregular, being either too much relaxed or too costive. In either case the motions are morbid, and always deficient of healthy bile. The consistence of the alvine dejections is often that of soft clay or putty, and they have a peculiar fœtor. This state of disease may be a long time before it arrives at its issue; but when the symptoms are more acute, when the constitutional derangements are great, the tongue dry and smooth, the fever very considerable, and the functions of the alimentary canal much disturbed, and signs of dysentery present, then danger is to be apprehended.

Abscess of the liver may terminate fatally without opening externally or into any internal cavity, and without communicating with any other organ. When such is the case, death is occasioned chiefly by the constitutional disturbance induced, and the disease of the bowels which supervenes in the last stage. When the abscess breaks internally, it is generally in one of two ways:—its external surface either becomes inflamed, and throws out coagulable lymph, which produces adhesions to adjoining parts; or no adhesion takes place, either from the absence of inflammation from its external surface, or from the inflammatory action of the part being insufficient for the production of coagulable lymph and the formation of adhesions. When no adhesions are formed, then the abscess breaks into the abdominal cavity, and excites peritoneal inflammation, which rapidly destroys the patient. When adhesions form, the abscess makes its way to other situations, according to the part of the liver in which it is situate, and the direction it may take. Thus it will make its way through the diaphragm into either the thoracic cavity or into the lungs themselves; or it will break into the stomach, or into the colon, or through the medium of the ducts into the duodenum: it may even communicate with the right kidney, and the purulent collection pass off by the urinary apparatus: but this is a rare occurrence.

With respect to the appearance of the liver upon dissection, when it contains one or more abscesses, it is necessary to make a few observations. These appearances, as well as colour of the matters which the abscesses contain, vary very considerably, according to the acuteness of the inflammatory action from which they have proceeded. Upon exposing the liver, it presents various appearances as respects its shape, according to the particular part in which abscess may be seated. When the abscess is in the right lobe, as it generally is, this lobe is always more or less enlarged,

according to the extent of the purulent collection. When it is either near the middle of the lobe, or more nearly approaches the superior surface of the viscus, this lobe assumes more or less of a spheroid or globular form, and rises high into the right thorax. When the abscesses are two or more, the form of the organ is more irregular, according to the parts which they occupy. The colour of the surface of the organ in cases of abscess is very various: sometimes it is of a pale orange, or of a pale or deep yellow, towards the apex of an abscess which has approached nearly to the surface of the viscus, while the parts towards the base are of a deep reddish brown, or even approaching a blackish hue. In some cases, the apex of the tumour of the liver is mottled or marbled of various colours. The surface of the viscus is generally of a deep-brown tint; and in some cases it is of a very dark hue, or marked with deeper-coloured spots. In the more chronic cases, the brown or deep-coloured surface of the liver is studded with minute collections of purulent matter, which seem to have been formed between the substance of the organ and its external covering. In some instances the surface presents a granulated appearance, with a few light-coloured vessels ramified through it.

The matter contained in an abscess presents various appearances: in some it is a thin, watery pus; in others it is thin, watery, and with thick, curd-like clots floating in it. In many cases it is perfectly purulent, and of varying degrees of consistence. As respects colour, there is also considerable difference; most frequently the matter is of the usual yellow colour. Sometimes it presents a yellowish brown or sanious tinge, and occasionally a greenish, greenish-brown, or greenish-yellow hue. Sometimes it is watery, and reddish-brown; at other times it is observed of a cream consistence, and nearly white. When the abscess is divided, so as to give a full view of its walls and the substance of the organ surrounding it, the appearances are very different in different cases. In some there seems to be no enveloping cyst beyond the texture of the organ. In these cases the adjoining substance of the viscus is much softened, red, and inflamed; and in a few instances I have observed it broken down, and hanging from the walls of the abscess in shreds. In other cases, where no distinct enveloping cyst exists, the surrounding texture of the organ is impacted around the abscess, and as if it were condensed and stretched around it from the distending power of the secreted matter, and the coagulable lymph effused in its immediate vicinity. The internal surface of the walls of the abscess, in contact with the matter in such cases,

possesses a fine cellular texture, approaching to the character of mucous tissue. In other cases, particularly when the matter is of a curdled appearance, a distinct cyst is found closely attached to the surrounding texture of the liver; and the cyst varies in its characters from a fine smooth membrane, admitting of being peeled from the adjoining tissue with difficulty, to a strong fibrous substance, of a hard gristly texture, nearly approaching the cartilaginous state in some parts. In the cases of abscess supervening to the more active forms of inflammation of the substance of the liver, the parts in the vicinity present more or less of the appearance of inflammation or congestion, and are of a brownish-red or deep brick colour. This greater depth of colour is often attended, also, with a change in the consistence of the texture. Sometimes it is softer and more friable than natural, at other times more dense and firm. In many cases the substance of the organ generally presents but few signs of increased vascularity or redness, until the immediate vicinity of the abscess is approached, when a zone of a deeper tinge, which becomes deeper still, the nearer to the purulent collection, surrounds the section of the abscess. In other cases, evidently of a slower and more chronic kind, little or no inflammation is observed in the vicinity of the abscess, excepting in the inner surface of the cyst, if there be one, or of the substance of the viscus in which the matter is contained. In other chronic cases, the substance of the liver is but little changed in colour from the natural hue, being only of a somewhat deeper tint and firmer consistence; but when divided by means of a very sharp scalpel, several small abscesses, similar to those already described as being sometimes seen on the surface of the organ, are found scattered throughout its substance, and containing a thick purulent fluid, varying from the consistence of thick cream to that of soft cheese. In these cases, the existence of a cyst or cysts is by no means evident; and the purulent matter seems to have been deposited in the substance of the organ, and to have had its more watery particles afterwards absorbed, thus leaving the cavities in which it was deposited imperfectly filled by the remaining more consistent matter.

It is not unusual to find, upon dissection, parts of the liver ulcerated; but I do not recollect meeting with a single case of this description which had not been preceded by either abscess, or by adhesions to adjoining parts. When an abscess forms in the superior part of the liver, and, by means of adhesions, finds its way into the lungs, and is emptied by expectoration, ulceration of the cavity in the liver from which the purulent matter issued, is sometimes

remarked. When coagulable lymph is thrown out from an inflamed part of the liver, so as to give rise to adhesions between it and an organ or surface opposite to it, ulceration may supervene in the parts thus connected. Adhesions formed in this way between the liver and colon occasionally ulcerate, the ulceration extending into the substance of the liver. When abscess bursts into the colon, ulceration of the parts of the liver adjoining the abscess has sometimes supervened, and precluded every chance the patient may have had of recovery. In a case where the inferior edge of the liver was adherent to the right kidney, an ulcerated cavity existed in the liver at the place of the adhesion.

Sect. IV.—*On the Treatment of Inflammation of the Liver.*

This is one of the most important subjects which a writer on the diseases of India can entertain. It is one also respecting which considerable diversity of opinion exists,—not so much as to the remedies which are requisite to the removal of these diseases, as to the extent to which they may be employed, and the period or stage of disorder and particular circumstances under which they are most applicable. I shall, therefore, consider the treatment suited to the more active, and more chronic forms of hepatitis; and view the most efficient means for their removal, in relation to the various circumstances in which they are generally required to be employed. The difference of treatment necessary in these diseases, as occurring in warm countries and between the tropics, does not consist in the kind of remedies required, but in the extent to which they must be carried in a short time, and the promptitude with which they ought to be prescribed upon the first appearance and development of the symptoms. In all cases the practitioner should not wait for disease of the biliary organs becoming more distinct and more marked: if he see but a single sign of excitement in this part of the economy, he should resort to active measures, anticipate the disease which is about to burst forth, and by meeting the coming evil, entirely avert it. This is the more necessary, as the most dangerous form of hepatitis, namely, that seated in the internal structure of the liver, often proceeds with a silent activity to an almost irremediable length, without evincing a single acute symptom. The practitioner, in such cases, should never be deterred by fears of debility or exhaustion supervening to the measures which are called for: he should always recollect, that Europeans, resident in warm countries, generally live too fully for the climate; that a ple-

thoric state of the vascular system generally, and of the portal system of vessels in particular, is the pathological condition which most generally obtains; and that this state, whether it be related to acute hepatitis, dysentery, functional disorders of the liver, or different types of fever, can be removed with sufficient celerity to prevent fatal consequences, only by vascular depletions and other evacuations: after the accomplishment of this object, the secretions of the large viscera may be promoted and corrected by suitable medicines, and the diet and regimen properly assigned.

Amongst the lower classes of Europeans in warm climates, particularly among soldiers, the habits to which they are more or less accustomed, and the length of time they have resided in the climate, should always be kept in mind by the practitioner, both as relates to the nature and extent of their diseases, and the remedial means employed. Amongst those who are addicted to the use of spirituous liquors, venesection is not so well borne as amongst the temperate and those of regular habits; and when it is necessarily put in practice, the exhibition of stimulants is often also required. But still, this effect of intemperance in restricting the use of depletions, is by no means so general as many suppose; and even where venesection cannot be attempted, local blood-lettings may be employed with advantage.

The time of residence in an intertropical climate is another point which should always be considered as particularly influencing the treatment, and modifying the character, of the disease; but it should no farther affect the former than in as far as it has effected the latter. The state of the economy, as respects vigour, vascular energy, and excitement, viewed with a due reference to the various circumstances of disease, constitution, and means of reparation, should be the real basis on which we ought to found our opinions as to the extent to which particular means of cure may be carried.

The prevailing character of the seasons, and the endemic peculiarities or circumstances of locality, ought also to have a considerable influence upon the choice of particular remedies, and the length to which they may be pushed; but this particular consideration, although deserving attention in hepatic diseases, is much more important in the treatment of those maladies which are to be considered in the further part of the present work. In all cases, the circumstances external to the patient, but acting upon his system, and those which are intrinsic, as regards his former state, his existing condition, and the extent, duration, and nature of his malady,

should be fully considered, and the remedies, according to what is known of their operation, prescribed in accordance with the views which a careful examination of all the circumstances have led us to entertain.

Sect. V.—*On the Treatment of the more Active Forms of Hepatitis.*

Blood-letting, general and local.—This is the most valuable of all the means which may be employed in the treatment of the various forms of hepatic inflammation occurring within the tropics; yet it is one which is by no means so extensively resorted to by many practitioners in India, even in the more active forms of the disease, as it ought to be. This circumstance, and the necessity of combating the ideas many entertain respecting active vascular depletion, will be my excuse for entering upon this particular topic with considerable earnestness. I can truly say, as respects the different forms of inflammation of the liver as they occur in India, that I have had occasionally to regret not having practised blood-letting when it might have been attempted with hopes of success, or carried it sufficiently far to be really beneficial; but I have never found that mischief resulted either from its performance, or the extent to which it had been pushed. Numerous instances, on the other hand, have occurred where,—from early education, the indulgence of prejudices, an indifference to the examination of those who have died of this class of diseases, and, consequently, from an insufficient acquaintance with the nature and extent of disease which occasioned death,—sufficient vascular depletion had been neglected at that stage of the malady when it might have been most serviceable, and the formidable consequences of disease prevented.

The European practitioner in India enjoys very great advantages in the abundance and excellence of the leeches of the country. With these, vascular depletions may be made locally to any extent, with a promptitude equal to venesection; and, amongst the greater number of those upon whom he will be required to practise, leeches may be used with more advantage than blood-letting from the arm. Venesection is, however, very urgently required in the present forms of hepatic disease amongst full-blooded and robust persons who have recently arrived in the country, particularly those of a fair complexion and sanguine temperament; but in those, local depletions are also often necessary. From numerous experiments made to ascertain the quantity of blood drawn by the leeches of

India, I have found that, one with another, they take away nearly one ounce and a quarter of blood each, independently of what escapes afterwards. The application, therefore, of from eighteen to thirty leeches, is equal to a full depletion from the arm, with the advantages of being near to the diseased organ, and of not producing so much exhaustion of the system as an equal quantity abstracted from a vein. These circumstances have generally induced me to take blood locally in the various forms of inflammation of the liver, proportioning the quanity abstracted to the particular circumstances of the disease and of the patient.

In the more active forms of hepatitis occurring in the plethoric and robust, more particularly those who have recently arrived in India, one or two full blood-lettings should be performed; and the first operation should be carried so far as to produce a very marked effect upon the pulse, without regard to the quantity abstracted. After this effect has been produced, the increased vascular action generally returns after a few hours. When this occurs, then the application of from sixteen to thirty leeches over the right hypochondrium and epigastrium will prove most beneficial. If the individual be robust, and not much reduced by these depletions, and the symptoms be not materially relieved after a few hours, the above number may be repeated, and, after the bites have been stopped by the application of any styptic, a large hot poultice may be placed over the situation where the more urgent symptoms were experienced, and frequently renewed. The bleeding from the leech-bites should always be arrested before the application of hot poultices, as there may be some difficulty of doing so afterwards, and because it is much better that an ascertained quantity of blood should be withdrawn, than an indefinite loss of this fluid be occasioned by allowing the bleeding to continue afterwards. The advantages of poultices at this time are very great, particularly when the hepatic disease is complicated with a morbid condition of the biliary secretion and a dysenteric state of the bowels: they remove the tension and pain felt in the region of the liver and throughout the abdomen, promote the determination of the circulating fluids to the surface of the body, and equalise the distribution of the blood.

It will not often happen that more than one depletion from a vein is required, when the first is made with sufficient promptitude, and carried as far as it ought. In plethoric individuals, however, the inflammatory action going forward in the substance of the liver is often attended with great congestion and tumefaction of the organ, and with an oppressed state of the pulse. In these, the first deple-

tion will sometimes produce faintness before a sufficient quantity is taken, the blood abstracted being very dark, thick, and oily, with a glutinous state of the serum; and vascular action, which was heretofore oppressed and laboured, becomes more violent and less embarrassed. When this takes place, a fuller depletion from the arm is required, and the patient generally can bear it better than he did the former; it commonly, also, gives more relief,—the blood becoming now more florid, and exhibiting either, for the first time, the buffy coat, or more of this appearance than it did before. But as long as the tongue remains excited, and pain, anxiety, or tension are complained of upon pressure, local depletions ought to be prescribed, and followed by internal remedies calculated to act upon the biliary and intestinal secretions, and to carry them off from the system.

One or two full depletions having been thus made with promptitude, even the most plethoric and robust will seldom require more than local depletions afterwards. In those cases of the more active form of hepatitis which are attended with considerable tumefaction at the epigastrium and hypochondrium, owing to congestion or enlargement of the liver accompanying, or supervening to, the inflammatory condition, the repeated application of leeches to the seat of tumefaction, even after one or more general blood-lettings, is often most serviceable, and tends more to remove this state of fulness and enlargement than venesection carried to the utmost limits. In all such cases, the institution of local depletions, followed in some cases by poulticing, in others, by blisters, and in others by the nitro-muriatic lotion, is one of the most efficient means of cure that can be possibly prescribed. In many of those cases, and in such more particularly as are characterised by congestion, by an oppressed and labouring pulse, an excited and foul tongue, and much disorder of the alvine evacuations, the blood abstracted by the leeches is of a very dark colour and thick consistence. Sometimes it has the appearance of tar, with considerable viscidity. These are evidently characteristic of a particularly low condition of the vital energies of the system, accompanied with congestion and a loaded state of the portal vessels: they could not have been the result of changes which the blood had undergone during the short time of its remaining in the stomach of the leech; inasmuch as similar appearances of this fluid are not met with in cases of local depletions employed during different conditions of the system, when the blood is in a healthy state, and the functions of the liver duly performed. In many of the cases wherein this morbid state of the circulating fluid

was apparent upon local depletion, it has been found necessary to exhibit internally diffusible stimuli, at the same time that the vascular load by which the portal vessels seemed to be oppressed, is removed, and attempts made to rouse the languid powers of secretion, and restore them to their healthy office.

In the less active forms of hepatitis, local depletions, accompanied with the other remedies which I shall presently point out, are generally all that is necessary. In debilitated patients the number of leeches applied should be few, and repeated after two or three days, the object being merely to unload the congested vessels, and thus restore the balance of the circulation. Each application may be followed by poultices, as already directed, by blisters, and lastly by the use of an alterative course of mercury, or by the nitro-muriatic lotion; and the nitric acid may be taken internally. The repeated application of leeches on the right hypochondrium, in those chronic cases which are attended with enlargement of the viscus, with obstructed secretion, and a disordered state of the bowels, ought never to be neglected, and the diet and regimen of the patient should be strictly attended to. In these, great discrimination in the choice of remedial means is necessary, and should be exerted with a strict relation to every particular circumstance of the case.

In soldiers addicted to the use of spirituous liquors, and who have resided for some time in a warm climate, hepatitis is seen in every grade of activity, from the most acute to the most chronic: in them, depletions must be instituted with great caution. Unless the pulse possesses much volume and strength, general blood-letting is seldom so beneficial in this class of patients as local depletions, carried to a length proportionate to the particular condition of the individual, and extent and activity of disease. Leeches applied to the epigastric and hypochondriac regions are indispensable; but the total abstraction of the accustomed stimulus should not be fully enforced at the same time, especially in those who are frequently intoxicated, without the substitution of some safer stimulant. In patients of this description I have generally prescribed, in order that the necessary local depletions might be made with advantage, and without lowering too far the energies of the system, the spirit of nitric æther, the compound spirit of ammonia, the carbonate of ammonia, the opiated tincture of camphor, or the spirits of lavender; and allowed an occasional glass of weak punch, with as light and nutritious a diet as the digestive organs apparently could manage.

In that sub-acute form of inflammation of the substance of the

liver which is attended with a very acrid and morbid state of the biliary secretions, and which is frequently productive of inflammatory action of the mucous surface of the large intestines, and dysenteric symptoms, with pain upon pressure on the cæcum, the employment of a large number of leeches over the right hypochondriac region, and over the situation of the cæcum, will always prove beneficial. The leeches should be repeated until the symptoms are relieved, and be followed by poultices, or by a blister: at the same time, the morbid secretions should be evacuated, by appropriate aperients; and, after the inflammatory action has been subdued, the secreting functions of the liver and intestines should be restored to their healthy state by a short mercurial course. When tenesmus has supervened in this form of inflammation of the liver, I have generally applied from ten to eighteen leeches to the sacrum with advantage, both as respects the disease of the liver and this particular symptom. It would be an interesting inquiry to ascertain the comparative good effects of local depletions in other situations than in that more immediately in the vicinity of the diseased organ. I have generally preferred the latter, chiefly on account of the subsequent application of hot fomentations and poultices, as already alluded to; but I have no doubt that the practice of applying a number of leeches in the neighbourhood of the anus, as practised by French physicians, and recommended by Dr. Thomas, Sir George Ballingall, and others, in all the forms of hepatitis and congestion of the liver, and more particularly when attended with dysenteric symptoms, is calculated to prove of great service.

It may appear, perhaps, incredible to many of my readers, after having perused the observations already made upon the habits and modes of living of many Europeans in India, that there should be still found practitioners who espouse opinions unfavourable to the employment of vascular depletions in the hepatitis of India, and who place their sole reliance upon the use of mercury or nitric acid for the removal of the disease; yet such is the case, although the number is daily diminishing, and more correct views are becoming very general. Many reject depletions altogether, because they consider that the state of the patient does not admit of the institution of venesection; and as they believe that general depletion cannot be ventured upon, because of the state of the pulse and the spurious symptoms of debility present, which, in short, is oppression of the vital power; so they overlook the fact, that, in the diseases of internal viscera particularly, local depletions may be performed, and even repeated, with the best effects, where venesec-

tion would be injurious, or, at least, of doubtful advantage. They also overlook an important circumstance connected with the state of the pulse, and of the energies of the system, frequently observed in hepatic diseases; namely, that the pulse may be weak and small, simply from congestion alone, or from this state accompanying the inflammatory action, and from the blood being determined to the internal viscera, and abstracted in an equal degree from the extremities and surface of the body; and thus from its accumulation in these viscera, oppressing, but not altogether overwhelming, the powers of life. In almost all such cases the pulse rises, and the energies of the frame are restored by the local depletions, even when a general depletion, in some few instances, might not be borne well by the patient. This is a point most deserving of attention; for to reject depletion altogether, because blood-letting from the arm may not safely be ventured upon, is as illogical in reasoning as it is most detrimental in practice.

Those who reason against the employment of vascular depletions, and rest their sole hopes upon the early induction of the mercurial action in the system, support their opinions by reference to the peculiar nature of the hepatitis in India, and that it differs altogether from inflammation of this organ as observed in temperate climates. I will allow a difference in some respects; but by no means consider it to be so great as they are desirous of establishing. Inflammation of the liver, when attacking its internal structure, is an extremely silent and insidious disease, assuming often the appearance of dysentery, and characterised very frequently by disorder or obstruction of the biliary secretion. But this particular form of hepatic inflammation, although a very frequent one in India, is not altogether confined to that hemisphere. Practitioners of experience have remarked similar forms of the disease in the western hemisphere, and even in Europe*; although they may be much less frequent in these climates than in India. A somewhat similar complication of inflammation of the substance of the liver with dysentery has been observed in Europe, more particularly in the warmer countries of this quarter of the globe, although the connexion was not detected until upon examination after death. When we consider the very few bodies examined in the times of Sir John Pringle, Cleghorn, Lind, and Clark, and that abscess of the liver, and other organic changes, were frequently found in those who were examined

* See Portal, sur la Nature et Traitement des Maladies du Foie, pp. 569, 570, et passim. Pringle on the Diseases of the Army, &c. p. 221—224. Cleghorn on the Diseases of Minorca, p. 227.

after having died of dysenteric complaints, we must consider the connexion of the bowel disease with inflammation of the substance of the liver very intimate in the countries of Europe to which their inquiries were confined, if indeed the former disease did not entirely originate in and depend upon the latter. The observations upon the hepatitis of India contained in Dr. Saunders's work on the diseases of the liver, have tended much to encourage the opinion, that hepatitis is not only a more frequent disease in the eastern hemisphere than in any other part, but is also there distinct in its characters from the inflammation of the liver observed in any other quarter of the globe, and requiring a different method of cure. The only difference between the hepatitis of India and of other countries, consists in its being more frequent in the eastern hemisphere, and from the internal structure of the organ, producing, from the low sensibility with which this structure is endowed, comparatively little disturbance of the system when it is in a state even of active inflammation, and still less when the inflammatory action is of a slow, sub-acute, or chronic nature, but occasioning marked disorder of the secreting function of the organ, and of the bile itself, and consequent disease in the alimentary canal, more particularly of the large intestines.

But as inflammation attacking the substance of the liver is not confined to India, or to tropical countries generally, so is the complication of this form of inflammation of the liver with disease of the bowels also extended to other climates and countries, whenever circumstances are present which are calculated to produce the original malady, and to favour the supervention of the consecutive disorder. The causes giving rise to disease of the substance of the liver and of the bowels, either in their separate or in their complicated forms of existence, are present in India in a very marked manner, particularly those to which soldiers and sailors are exposed: hence, in some measure, the frequency of their occurrence; but that they are also often present in a somewhat modified form, and produce nearly similar effects, in both the western hemisphere and in the Mediterranean, has been sufficiently proved by various publications upon hepatic diseases and dysentery, as observed in these parts of the globe, which have issued from the press during the preceding twenty years, both in Europe and America.

Inflammation seated in the substance of the liver is attended very frequently with a morbid state of the biliary secretion, with tumefaction of the organ, and with an irregular state of the bowels, readily running into a dysenteric form, and constituting what is not

improperly called hepatic dysentery. Let me for a moment advert to the almost uniform appearances met with upon examination of the fatal cases of this disease, as detailed in the preceding observations. Do not these appearances evince, in every instance, either inflammation of the substance of the liver and large intestines, in almost every stage of its progress, or some one of its legitimate consequences? In what manner can this condition be removed, or any one of its effects prevented, but by decided antiphlogistic measures actively exercised at the commencement of the disease? No person who possesses just views of the operation of mercurial preparations upon the system, can suppose that the specific operation of this mineral will be readily induced in the system, during inflammatory diseases, before depletions have been instituted; or can doubt, if the use of this agent be persisted in before such depletions have been performed, that the irritable state of the pulse will be increased, and the supervention of abscess of the liver thereby promoted. I will not deny, that if the disease of the liver be of a chronic form, and occur in those who possess a languid or weak circulation, the mercurial action may be speedily induced, full ptyalism ensue, and the disease quickly removed; but if ptyalism be not soon produced, and the mercurial treatment be persisted in for too long a period, much serious mischief will often ensue, more particularly if any constitutional inaptitude to the specific influence of the mercury exist.

Mercurials, Purgatives, and Laxatives.—When describing the history and symptoms of inflammation of the liver, I stated, that in nearly all its forms, the biliary secretion is much altered in quality, and very frequently diminished in quantity; and that, in conjunction with this condition of the bile, the secretions poured out from the mucous surface of the intestinal canal, more particularly of the large intestines, are also of a morbid state. In order to remove these disorders, in addition to the depletory means already treated of, purgatives should be given, and repeated daily; so that further disease be not induced by the remora of the morbid secretions in any part of the bowels. For this purpose, immediately after the first vascular depletion, a full dose of calomel should be given, as this medicine appears to be the most beneficial in inflammatory states of the system, the most active in eliciting a healthy secretion of bile, and the most efficient in dissolving that viscid and tenacious secretion which covers the mucous coat of the intestinal canal at the commencement of nearly all the disorders affecting the organs of digestion. Unless the patient has come under treatment early in the day, when this medicine must be given immediately, I prefer

the exhibition of it at bed-time, as it will then not disturb the rest of the patient by its operation, and will have had time to produce its effects upon the secreting viscera before morning; when a brisk purgative should be given, in order to carry out of the system accumulated fæces, and those morbid secretions which the previous exhibition of the calomel had prepared for removal. One of the best cathartics for this purpose is the common purging powder, consisting of supertartrate of potash and jalap. This powder generally procures a full but not frequent evacuation, and produces less irritation of the mucous surface of the bowels than any other which can be employed. Next to it, castor oil, or the common black draught, as it is usually prepared; or, what is yet better, particularly when the energies of the system are much impaired, the combination of the compound infusion of senna with the compound infusion of gentian, to which may be added some cathartic or laxative neutral salt, or the sp. ammon. arom., the sp. æther. nitr., and any corrigent which the circumstances of the case may warrant.

In the treatment of diseases of the liver, as well as of other diseases, in warm climates, care should be taken not to disturb the rest of the patient by exhibiting purgatives so as to operate through the night. In cases where, owing to disorder of the bowels, the rest is thus disturbed, it should be the object of the practitioner to allay this disorder during the hours of repose, by means of an anodyne draught or enema, and to give a purgative powder or draught early in the morning. Even when it is our wish to continue the exhibition of full doses of calomel, they may be still given at bed-time, in conjunction with an anodyne draught or enema, without counteracting this intention; for calomel, given at night in a full dose, will seldom or ever operate before morning. There is nothing which tends to keep up the energies of the frame more throughout a long illness than the enjoyment of repose during the night; whilst, on the other hand, nothing tends more to lower them than frequent calls to stool during the hours devoted to repose. In many situations, also, within the tropics, especially where there is a free ingress of the night air, and when the nights are comparatively cold, damp, and chilly, the patient is exposed to the most active causes of disease,—causes which, although they will not frequently induce a different disorder from that under which he is then labouring, will generally aggravate the symptoms, and heighten the danger from the one with which he is afflicted.

If the exhibition of twenty grains of calomel at bed-time, and a purgative in the morning, saline diaphoretics being given through

the day, affect the mouth, which frequently happens when vascular depletion has been carried sufficiently far, ptyalism should be quickly induced; but after its supervention, mercurials ought to be laid aside for a time. The reason of recommending the speedy induction of ptyalism after the mouth becomes affected, is an idea which I entertain respecting the influence of the constitutional effects of mercury upon inflammation of the liver; namely, that to induce the mercurial excitement of the vascular system, indicated by slight soreness of the gums, and to exhibit mercury or calomel in small quantities, frequently repeated with this view, is to keep up a state of slow inflammatory action in the secreting substance of the liver, which may of itself terminate in abscess; whilst, if the full operation of mercurial remedies be speedily induced, and ptyalism become abundant, a derivation from the seat of disease is occasioned to the mouth and salivary apparatus, the disease in the liver speedily subsides, and the functions of the organ are restored to their healthy state. I believe that much evil very frequently results from the general habit of giving too frequent doses of calomel with a view of inducing the constitutional effects of mercury. Those who prescribe five grains of calomel every three or four hours, with this view, produce much greater irritation of the alimentary canal, are longer in obtaining their object, and exhibit much more calomel for the removal of the disease, than those who give twenty grains only at bed-time. This latter dose acts as a sedative to the irritable stomach in this disease, whilst smaller doses increase the irritability of this viscus when it is present, and often induce it where it was previously absent.

Where much disorder of the bowels exists or supervenes during the course of the disease, the calomel may be given with one or two grains of opium, and as much powdered ipecacuanha, or an anodyne draught, exhibited at the same time. In order also to sheath or protect, in such cases, the mucous surface of the large intestines from the irritating effects of the morbid secretions passing through them, emollient enemata should be thrown up, and the more gentle aperients given. When calomel has been exhibited in the manner now stated, it will often soon affect the system, in addition to its operation upon the functions of secretion, and upon the secretions themselves; and this will be induced with a celerity in proportion to the activity with which vascular depletions have been performed. But in many cases, particularly those in which the symptoms disappeared quickly after blood-letting, the patient recovers so rapidly, that the exhibition of the calomel at bed-time is left off, the hepatic

and intestinal functions having been restored to their healthy states, before sufficient time has elapsed to produce the specific effects of the medicine upon the system. Hence I have been led to state*, that if the constitutional effects of calomel, when given in the manner here recommended, do supervene, the circumstance is to be considered as being favourable to the speedy removal of the disease; but to continue to give calomel, or to exhibit mercurials, after the secretions have been restored to their healthy state, and the symptoms of disease have subsided, is to occasion inordinate excitation of the functions of an organ which has recently suffered from disease, and which is but too prone to resume the morbid state.

When the gums become tender from the use of calomel, as recommended, the speedy induction of ptyalism may be procured, if the symptoms indicate the propriety of the measure, but not otherwise. If the secretions have assumed a healthy character, and the signs of disease have vanished, then no further exhibition of mercurial medicines need be practised until the state of the bowels require them; and gentle tonics, with alteratives and saline aperients, may be given, in order to restore tone to the digestive organs, and promote the functions of the abdominal viscera. But if the secretions and stools still remain morbid; if any disorder can be detected, by a careful examination of the patient, in the seat of the liver or in the abdomen; if the tongue be not natural; and if the countenance be sallow or unhealthy,—the speedy induction of ptyalism will then often prove of service. If, however, we fail in inducing this effect in the course of four or five days, we shall generally find it detrimental to continue this plan any longer. The means by which the speedy induction of the mercurial action may be accomplished are various; but that most to be relied upon is mercurial inunction, performed thrice a day, with a combination of camphor with the mercurial ointment, the patient taking the usual full dose of calomel at bed-time, combined with James's powder, or antimonial powder and opium. The combination of calomel with any of the preparations of antimony tends greatly to hasten the specific effects of mercurial medicines, particularly after blood-letting. The pil. hydrarg., either alone or in combination with calomel, may also be given during the day, in order to promote the same end, and emollient enemata thrown up, to allay any irritation which may supervene in the large intestines; whilst an occasional cooling purgative, or an aperient, should be taken, for the purpose of evacuating the morbid biliary and intestinal secretions which rapidly form

* See "Sketches of the Diseases of India."

in hepatic diseases, and which, if not removed from the bowels, would speedily induce ulceration in the situations in which they might, even for a short time, lodge. As soon as ptyalism has been produced by these decisive means, then the employment of all mercurial remedies should be intermitted, and gentle tonics, combined with the alkaline carbonates or with saline aperients, and a light, nutritious diet, ought to be prescribed. It is not necessary, in hepatic diseases, to continue this effect upon the salivary apparatus above a few days; for its influence upon the disease is produced in a short time.

The observations which have been now offered respecting the employment of purgatives and mercurials, have a stricter reference to the more active forms of inflammation of the liver. In the subacute and less active cases, particularly those which have been of somewhat long standing, or which have supervened to previous attacks of disease of this viscus, the use of deobstruent and saline aperients and purgatives, alternated with mild mercurials and alteratives, and occasionally with a full dose of calomel at bedtime, is generally most beneficial, particularly when local depletions have been employed with sufficient decision. If these means fail of producing a decided influence over the disease, then the practitioner should endeavour to induce, as quickly as possible, the full effects of mercury, after the appearance of which mercurial remedies may be, at least for a time, laid aside.

When great congestion and enlargement of the liver accompany the inflammatory state, repeated leeching is requisite; and a regular and decided purgative course should be followed up. In these cases, however, saline purgatives, such as the sulphates of soda and magnesia, procure only watery stools, and harass the patient. If these be given, they should be combined with the compound infusion of senna, or of senna and gentian; and, if necessary, the tincture of jalap may be added. Purgative enemata may be also exhibited; and in order to emulge the biliary ducts, and by this means overcome the congestion of the organ, twenty grains of calomel should be given every night, followed by a purgative in the morning, until a decided effect is produced upon the disease. After the local depletions have been employed, and the inflammatory action entirely removed, blistering on the region of the liver is beneficial, and should never be neglected; and in the more chronic and obstinate cases, the blister should be kept open, or an issue be made in the lower part of the side.

Purgatives and laxatives operate more copiously after full deple-

tions; and the action of blisters upon the region of the liver tends both to promote this effect, and to procure a freer secretion of more healthy bile. In no instance of inflammatory or other attacks of disease of the liver, should the physician neglect to inspect the motions passed by the patient; for it is chiefly by the condition of these that we are informed respecting the operation of the remedies, the secretions of the diseased organ, and the progress of the disease. The patient's account of them ought never to be depended upon.

On other Means of Cure which frequently prove beneficial.—The remedies of which I have already treated generally prove of themselves sufficient for the removal of the more active inflammation of the liver. Whatever derangements remain to be combated after these remedies have been employed partake most frequently of that character which the more chronic disorders of the liver assume; and the same treatment which the latter require is also beneficial in them. Even after the most acute symptoms of the disease have yielded, and the functions of the digestive organs have been restored to a certain extent, still it often occurs that considerable torpor of the diseased viscus continues, and a course of gentle laxatives and deobstruents, combined with tonics, is required, for the purpose of assisting the secreting power of the liver, of stimulating the sluggish bowels, and imparting tone to the frame generally. That an organ which has been the seat of acute disease, and which has most probably suffered in some degree in its organisation as well as in its functions, should have its actions impaired for some time after the more urgent disorder is relieved, may be reasonably expected. This state of function, whether it be the consequence of acute disease, or the concomitant of chronic derangement, ought to receive due attention from the practitioner. To fulfil the purposes of removal, the different relations of deficient energy of the liver ought to be considered, and the treatment directed accordingly. When an inactive state of secretion is present after acute or sub-acute inflammation of the viscus, the state of the organ, as regards the existence of pain, or of tumefaction or enlargement, ought to be carefully inquired into. If enlargement be detected, then small doses of the blue-pill, either alone or combined with Plummer's-pill, may be given at night, local depletion having been satisfactorily premised; and weak solutions of the neutral salts, or the infusions of senna and gentian, either alone or with salts, or the carbonates of the alkalies, may be taken early in the morning. If impaired and morbid secretion proceed from slow and insidious

disease, and is connected either with congestion in the branches of the vena portæ, or with accumulations of inspissated or viscid bile in the hepatic ducts, or with chronic inflammatory action and a morbid state of the bowels, local depletions must not be overlooked; the mercurial remedies should be pushed farther, mercurial inunction on the region of the liver employed, and a full dose of calomel given at bed-time every third night, and followed in the morning by the common purging powder, or cathartic draught. If these means fail of producing a decided advantage, the greater part of the abdomen and both hypochondria should be sponged night and morning with the nitro-muriatic lotion, or the patient should use as a common beverage, of which he should drink frequently, the nitric acid in a state of weak solution. This is generally very grateful to the patient; and if the acid be given in sufficient quantity to produce a gentle excitation of the salivary secretion, much benefit will often be experienced from it. There are very few remedies which are more deserving notice than the nitro-muriatic acid lotion, and the internal use of nitric acid, in cases of acute hepatitis, after active depletions and mercury have been used: they promote the return of strength and the healthy establishment of the biliary secretion; and if deobstruent laxatives, with suitable regimen, be prescribed, and adhered to during their use, they remove obstructions, and promote a free circulation in the vessels of the liver. As a restorative of the energies of the system after mercurial courses, they have generally proved beneficial, particularly when conjoined with the cautious exhibition of gentle tonics, with light but nutritious diet, and suitable regimen.

On the Treatment of the Complications of Acute Hepatitis.—Active inflammation of the liver often affects the stomach, sometimes symptomatically, at other times from the proximity of the part inflamed to this viscus, or from the extension of the inflammatory action to it. In either case, the removal of the disordered state of the stomach must depend upon the treatment adopted for the primary disease. There can be no means more efficient in fulfilling this intention, and in protecting the stomach from disorder, than the active depletory treatment just advocated; and where it is practised sufficiently early in the disease, I have seldom observed inflammatory action extend from the liver to this viscus. In those cases, however, which have been neglected at their commencement or which have been treated too exclusively by means of mercury, with a view of inducing salivation, to the neglect of sufficient depletion, the supervention of gastritis to hepatitis is not an unfre-

quent occurrence; the stomach being found inflamed upon examination after death, and glued to the concave surface of the liver, and sometimes also to the gall-bladder and ducts, by means of coagulable lymph effused from the inflamed surfaces. I have known cases wherein gastritis had supervened in its more dangerous form,—with cold extremities, quick and weak pulse, collapse of the features, great pain, anxiety, tenderness at the pit of the stomach, and cold perspirations,—during the treatment of the hepatic disease; and where these symptoms were mistaken for those of abscess of the liver, and treated accordingly, the patient dying of the gastritis, without having undergone any depletion, and where little further was attempted than the exhibition of stimulants or tonics, or the induction of the specific effects of the mercury, which the existing febrile action, and the condition of disease and of system, prevented from supervening.

In the complication of gastritis with active inflammation of the liver, the treatment is nearly the same as that already stated. Depletions are obviously requisite, particularly copious local depletions, which should be repeated, and followed by the application of hot poultices, as long as tenderness is felt at the pit of the stomach. Large doses of calomel should be combined with opium, and the bowels excited to action by means of cathartic enemata. When the inflammatory action is subdued, then blisters, applied to the stomach and right hypochondrium, are generally beneficial, with the other details of treatment recommended in the section on the Treatment of Inflammation of the Stomach. In every mode of complication between inflammation of the liver and stomach, the treatment which is best calculated to remove the one will generally relieve the other. The only precaution which should be attended to is not to irritate the inflamed stomach by the exhibition of stimulating or acrid purgatives: either the administration of purgatives by the mouth should be postponed (with the exception of the full doses of calomel and opium, which directly tend to subdue the disease in the stomach,) until the more acute symptoms are subdued, or those which are given should be the least likely to irritate this viscus, and be possessed of cooling properties; such as the super-tartrate or tartrate of potash, or the soda tartarizata, dissolved in tamarind water. Purging enemata should be frequently thrown up, and the lower part of the body occasionally immersed in a warm bath.

Inflammation of the liver, particularly in its active form is not unfrequently complicated with thoracic disease. When acute inflammation attacks the convex surface of the liver, and, nearly simul-

taneously, the pleura and right lobe of the lungs, depletions, both general and local, are imperatively called for, and should be practised with boldness until the inflammatory signs entirely disappear, after which blisters should be applied; but in no case ought these latter to be prescribed until the inflammatory action has been subdued.

In the complication of hepatitis with thoracic disease, it is often difficult to ascertain which is the primary disorder. On many occasions, disease supervenes in the form of pleuritis, or pneumonia, and seems to extend to the liver, owing to the predisposition of this organ to undergo inflammatory action, either from the pre-existence of functional derangement, or some other cause. In many instances, the inflammation extends from the superior surface of the liver to the diaphragmatic pleura, and thence to the costal pleura and lungs themselves. In those cases where much congestion accompanies the inflammatory action of the convex part of the right lobe, which, owing to the congested state, rises high into the right thoracic cavity, carrying the diaphragm before it, pneumonia is more or less completely simulated, according to the extent to which this part of the liver is enlarged, and the functions of the right lung impeded. The dyspnœa and cough which accompany this state of acute hepatitis often render it a matter of considerable difficulty to distinguish between it and pneumonia. When the lungs or pleura, or both, are simultaneously affected with the liver, there will, of course, be present the chief signs of both diseases; yet, on many occasions, this complication may be viewed as being either simple pneumonia, or an uncomplicated hepatitis. The extent to which the right lobe of the liver rises into the right thoracic cavity, in some cases, and thus simulates pneumonia,—even though the viscera in this cavity be perfectly sound, the lungs being only compressed by the enlarged liver,—may readily be inferred. When the symptoms of disease are referred chiefly to the chest, the state of the respiration and the character of the cough; the absence of the sputa marking disease of the lungs; the state of the digestive and alvine functions; the appearance of the fæcal evacuations, and of the urine; the expression of the countenance; the colour and condition of the skin; the states of the tongue and mouth; and the general character of the pulse; will readily enable the practitioner to decide whether the liver or the lungs is the seat of disease; and, in complicated cases, what share of disorder is to be referred to each.

Disease, nevertheless, of the thoracic cavity is not unfrequently met with upon examination after death, although it was scarcely

detected during life, in several of the more chronic cases of hepatitis, more particularly those in which inflammation of an acute character had commenced in the convex part of the right lobe, and had been only partially subdued; so that some one of its consequences, such as abscess, with chronic inflammation of the adjoining parts, had supervened. Thus, adhesions between the lungs and costal pleura, or between the lungs and diaphragm, have been observed both recent and apparently of an old date; effusions of fluid into the thoracic cavity; and tubercles, or small vomicæ, in the lungs, when the pulmonic symptoms present had been but little attended to, and been viewed merely as symptomatic of the hepatic disease. The necessity of discriminating between the complications of actual disease and the mere presence of symptomatic disorder of function, is fully evinced by such occurrences; and where the practice is not to deplete largely in hepatic disease, such complications are very liable to supervene, and when they have supervened, are extremely prone to an unfavourable termination.

This result of observation, during different periods of my practice in hepatic diseases, has confirmed my opinion as to the propriety of decisive antiphlogistic measures in all cases of active inflammation of the liver, not merely as being calculated to remove it in its primary seat, but as being most essentially beneficial in preventing the extension of the disease to adjoining viscera, and of removing inflammation when it has thus made progress, and especially when it has occurred simultaneously in two or more organs or structures.

In the complication of hepatitis with pleuritis or pneumonia, active depletions are especially required, and all the details of the antiphlogistic regimen are necessary to their fullest extent. Copious purging should never be neglected; and during the periods intervening between the exhibition of aperients or purgatives, saline diaphoretics, with the sp. æther. nitr., and the liq. antim. tart. should be exhibited. Antimonial preparations ought never to be omitted, whenever we have reason to suppose that disease either already exists in the thorax, or is advancing from the liver to that cavity. They may be given, according to the particular circumstances of the case, along with other saline medicines, or with nitre and demulcents, with the liq. ammon. acet., or with the different preparations of mercury. When exhibited in this manner, they may be pushed so far as to occasion some degree of nausea. But if inflammatory action evidently exists in the liver, vomiting should not be produced; for although the action of vomiting may relieve

the affection of the chest, it will generally aggravate the disease of the liver. I have frequently remarked, that, when an emetic had been exhibited in the more obscure cases of hepatitis, inflammatory action was rendered more acute and much more manifest by its operation, and that, although it was thereby aggravated, a beneficial effect proceeded from this circumstance, inasmuch as more decided measures were resorted to for its removal. When the disease presents the complication now under consideration, much benefit will often result, after depletions, purgatives, and antimonial diaphoretics have been carried sufficiently far, from the use of blisters, either on the opposite side, or on the right hypochondriac region; but until all inflammatory action has been reduced, little advantage can be expected from this means. I have even seen decided mischief arise from the too early employment of this mode of counter-irritation, owing to the cantharides heightening the inflammatory action already existing; and, on this account, have preferred the insertion of an issue or seton, and have recently resorted to the use of the tartar emetic ointment until a full eruption of pimples has been induced. In order that this effect may be procured as soon as possible, the ointment, consisting of two drachms of the tartar emetic to one ounce of prepared lard, should be rubbed upon a part in the vicinity of the seat of disease three times a day. In this complicated form of disease, the mercurial remedies ought to be given, in combination with antimony, camphor, and opium; and if they do not produce a decided effect upon the disease, after they have been exhibited with activity for two or three days, they should be laid aside, and the nitric acid drink, with a few drops of opium, given for some time in their stead; the bowels being always well acted upon by purgatives, aperients, or enemata, according to the peculiarities of the case.

Sect. VI.—*On the Treatment of the more Chronic Forms of Inflammation of the Biliary Organs.*

The chronic forms of hepatitis I have already shown to be essentially similar diseases to the more active varieties, and only to differ in the duration of the disorder, and in the texture of the organ more generally the seat of the inflammatory action. I have also shown, that when inflammation of the internal structure of the organ assumes an active character, it ought not to receive the appellation of chronic, merely because it evinces no very acute or

very painful symptoms: as respects its nature, duration and consequences, it is as much an acute disease as that form of hepatitis which is seated chiefly in the surface of the organ. I have also considered it right to direct the practitioner's attention to the fact, that no general proposition regarding the condition of the biliary secretion should be confided in: for although this secretion is generally in smaller quantity, more remarkably changed from its healthy characters, and more frequently obstructed, when the inflammation is seated in the internal structure, than when the surfaces are the seat of disease,—yet the exceptions seem to be numerous, and forbid any reliance being placed upon this circumstance, as forming a basis for an indication of cure. Another circumstance, of importance in the treatment, and hence deserving notice at this place, is, that the division of hepatic diseases into acute and chronic is entirely arbitrary, and should be adhered to only as far as respects the duration of disease. As, however, chronic inflammation very frequently remains after the active disease is subdued, and as nearly all the morbid changes met with upon *post mortem* examination of the liver are more or less accompanied with, or related to, slow inflammatory action, either of some part of the liver itself or of the gall-bladder and ducts, I have included all these derangements under the observations on the history of chronic inflammation of this organ. I have been induced to the adoption of this plan by the desire of avoiding repetitions, into which I must have been inevitably led by the separate consideration of minor pathological conditions of this viscus; and by the consideration, that the greater number of those conditions, even did they admit of being recognised in practice,—require similar modes of treatment, and nearly the same remedies, for their removal.

Vascular Depletion.—Whether chronic inflammation of the liver continues as a consequence of the active form of hepatitis, or takes place primarily, local depletion should be practised, according to the state of the pulse and the appearance of the tongue, and the habit and constitution of the patient. Reference also should be paid to the mode of living followed by the patient, and the length of time he has passed in a warm climate. If depletions have been decidedly practised in the active inflammation of the liver, they should be more cautiously resorted to in the chronic form of the disease, but when they have been either entirely or in part neglected in the acute stages, local depletion should be directed with greater boldness in the chronic disease yet remaining, and be

repeated according to the effects produced on the disease and on the state of the patient. After the leeches have ceased bleeding, poultices should be applied and frequently renewed; and calomel may be given at bed-time, as already recommended, and followed in the morning by a purging draught.

In those cases of chronic hepatitis which supervene without any previous acute disease, and particularly such as are accompanied with any evident degree of congestion and enlargement of the viscus, copious local depletion is especially required. This form of hepatic disorder is generally more or less connected with accumulations of morbid secretions and of fæces on the mucous surface of the alimentary canal and in the cells of the colon, which dispose this surface to inflammatory irritation and ulceration, when acted upon by those morbid and acrid secretions of the liver characterising a very large proportion of the cases of this particular description of chronic hepatitis. The necessity of carrying off these accumulations, when treating this form of disease, at the same time that we endeavour to remove morbid action of the liver, and promote a free and healthy discharge of bile, must be apparent. When, however, the biliary and intestinal secretions are even partially disturbed by the means pursued, disorder will be heightened, as respects the feelings of the patient, until they are completely removed, by the repeated exhibition of purgatives. The purgatives may be selected for this purpose according to the circumstances and complications of individual cases; but, generally, a full dose of calomel given at bed-time, and an aperient draught taken early in the morning, will be found most beneficial. After we have accomplished this intention, the calomel may be changed for some milder mercurial preparation, as the blue-pill, or the hydrarg. cum cretâ; and mild saline aperients with antimonials may be continued through the day, for the purpose of promoting the biliary and intestinal secretions, of removing obstruction when it is present, of determining to the surface of the body, and keeping up a gentle action in the bowels. In chronic cases of this description, dysenteric symptoms are not unfrequently present. When such is the case, enemata, either of a purging or of an emollient nature, shou'd be administered, and the pulv. ipecac. comp. given in combination with the blue-pill at bed-time, and be followed by a dose of castor oil in the morning. In many cases, much advantage will be derived from the use of a flannel bandage kept constantly applied round the abdomen; and the local depletions which have been practised may be followed by blisters on the epigastric or hypochondriac

regions, and these by the nitro-muriatic lotion until a healthy state of the secretions be brought about.

The Nitro-muriatic Solution.—After the acute symptoms have been removed by decided treatment in the active form of hepatitis, and after the means now noticed have been employed in the chronic state of disease, this remedy should be resorted to, if any disorder still remain as regards the functions either of the liver itself or of the bowels. The hypochondria and abdomen should be sponged with it night and morning, or the feet and legs should be immersed in a bath prepared with it, as directed below.* I have experienced the most decided advantage from this medicine in the form and stage of disorder now under consideration; and, indeed, in all functional disorders of the liver. In the more chronic forms of disease of this viscus, more particularly such as are connected with enlargement of its structure, and a morbid state of the biliary and intestinal secretions, I consider it one of the most valuable remedies we possess. When this remedy is resorted to, it should be

* The nitro-muriatic solution, lotion, or bath, may be made in the following manner:—Into a common quart bottle put about eight ounces of pure water, to which add four ounces of the nitric acid, and four of the muriatic acid, of the strength of the London Pharmacopœia. The "*Nitro-muriatic Solution*" is thus formed. If it be intended to use it in the form of a bath, from two ounces of it to five, according to the strength of the patient, may be mixed with from two and a half to three gallons of warm water, of a temperature nearly approaching that of the blood, in a high and narrow vessel, and the feet and legs kept immersed in it for about twenty minutes or half an hour, every night before retiring to rest. If the bath does not occasion a pricking or itching sensation in the parts immersed, after twenty minutes have elapsed, the next bath should be increased in strength. Although I have frequently employed this bath, and generally with advantage, I prefer, in many respects, the practice of sponging the trunk of the body, particularly the abdomen, with the nitro-muriatic lotion.

When the nitro-muriatic solution is to be employed in the form of a lotion, from two to three drachms of the *Solution* should be added to a pint of warm water, and the trunk of the body, insides of the thighs, &c., assiduously sponged with it, by means of a large sponge, for about a quarter of an hour daily, or, occasionally, night and morning. I have found great advantage from employing this solution also in the form of poultice, in torpor of the liver and in chronic affections of the organ, attended with enlargement and a deficient and morbid state of the biliary secretion. Occasionally, much benefit will arise from employing the lotion in the form of fomentation; the water having been made as hot as 130° or 140° of Fahrenheit, when the acid solution is added. When this is practised, the flannels soaked with the lotion should be applied for about an hour or two every night. It may be employed, also, with advantage by keeping cloths wet with the solution over the hypochondria and abdomen, and placing over them warm poultices; both the moistened cloths and the poultices being renewed from time to time.

daily employed for some time, according to its effects; but it should not be left off until after two or three weeks' trial, unless it shall have fulfilled the intentions with which it had been prescribed, before that time. Even after its use has been intermitted for some time, its effects will frequently continue to appear. In the more obstinate cases, therefore, advantage from it should not be despaired of, even after it has been laid aside; and although the first course of it may have been ineffectual, a second trial may prove decidedly beneficial.

In administering this remedy, care should be taken as respects the exhibition of mercurial medicines; a short time should be allowed to elapse from the mercurial affection of the system, till its employment is commenced. Purgatives, however, may be exhibited, from time to time, during the nitro-muriatic course, in order to carry off the secretions of the liver and intestines, which are liable to accumulate and occasion disorder. For this purpose the common purging powder, or the bitter purging mixture, either with or without salts, may be given occasionally, and the diet and regimen regulated in the same way as stated in the observations on the Treatment of Diseases of the Stomach. The nitro-muriatic solution may be employed in any of the modes recommended either with a view of restoring the healthy functions of the liver and abdominal viscera, after an acute attack of hepatitis, or with the intention of promoting and correcting the secretion of bile in chronic disorder of the liver, and in those derangements which are attended with more or less of structural derangement, whether of the biliary organs themselves or of the adjoining viscera. I have frequently observed, after it has been employed for a few days, that the patient has complained much of heaviness or drowsiness. When this is the case, active purgation should be instituted, in addition to the use of the solution, which will soon bring away morbid and offensive stools, and remove this symptom of disorder. Where abscess is already formed, we can scarcely expect any advantage from the nitro-muriatic solution, more than from any other remedy. But as *post mortem* examinations have shown that abscess has been occasionally formed in the liver, and afterwards absorbed, the structure of this organ having been nearly restored to a healthy state, even where the previous existence of abscess was most evident, we should not despair of the patient's recovery, as long as the energies of the system admit of being kept up by means of suitable treatment.

During the nitro-muriatic course, considerable advantage will often be derived from the change of air to a moderately cool and

pure climate, provided that the change be made with due precaution, and neither suddenly, nor to the extent of affecting materially the sensations of the patient: a feeling of cold ought not to be occasioned by the change, and the patient should not be placed out of the way of the best medical advice. A sea-voyage or excursion, when the advantage of medical care can be enjoyed at the same time, is very often serviceable: but if the voyage be to a colder climate, great care is often requisite on the part of the patient, and much science on that of the medical attendant, to prevent a relapse of the disease.

The Nitrous Acid.—This medicine has been long employed in India, in a state of weak solution, as a common drink in hepatic diseases, and as an alterative remedy, with the intention of promoting the secretion of bile, and restoring its healthy character. For this purpose the dilute nitrous acid may be used largely, and carried as far as six drachms in the twenty-four hours. After some time, generally three or four days, it usually occasions a slight salivation; but its beneficial effects are often produced when given in smaller quantities, without this operation on the salivary glands. The nitrous acid generally requires a longer use than mercurial remedies, in order to obtain its good effects. Sir James M'Grigor, in his interesting account of the diseases of the 88th Regiment, (Edinb. Med. Journ. vol. xvii.), appears to consider it equal to mercury in the cure of hepatitis. I believe that it is, on many occasions, a safer remedy than mercury, as regards the manner in which this latter medicine was usually prescribed at the time he wrote. Although I have frequently been inclined to question the propriety of directing a course of the nitrous acid when mercurials were being exhibited, yet I never saw cause in practice to suppose that any bad effect arose from the continued exhibition of both these remedies within a few hours of each other. Indeed, in many cases, I have had reason to agree with Sir James, and to consider the combined operation of mercurials, especially when employed externally, and of the nitrous acid internally, as being more beneficial than the use of either of them separately.*

* It will be, however, much safer not to exhibit the nitric acid at the time of prescribing mercurials internally. The practice I have always observed, of giving only one large dose of calomel in the twenty-four hours, at the time of repose, and of using the nitrous acid only through the day, a purgative draught having been administered early in the morning, may have prevented any ill effects from arising out of the employment of both these active remedies. The oxides of mercury, whether in the form of blue-pill or in any other form, certainly ought not,

To attempt to affect the system with mercury in the active forms of hepatitis, or in many cases of the chronic disease, before the inflammatory action is sufficiently subdued by the more energetic antiphlogistic remedies, is the cause of its often failing to relieve the disease; and when thus prescribed, it is frequently prejudicial, and even calculated to increase the disposition of the diseased organ to run into abscesses. This objection does not, however, apply to the use of nitrous acid, nor to that of the nitro-muriatic acid solution; and although these remedies are chiefly beneficial after the more acute symptoms are subdued in the more active forms of hepatitis, and should therefore only be employed when this indication has been effected, yet the earlier use of them will not be productive of any bad consequences. In the chronic forms of hepatitis, and in most of their attendant organic lesions, they may be serviceable, in assisting the absorbent vessels to remove morbid depositions, and in promoting a healthy state of function in the secreting glands and surfaces engaged in the actions of digestion.

Blisters.—In the treatment of the more acute forms of inflammation of the liver, blisters ought never to be resorted to, until vascular depletions have been employed so as to subdue the inflammatory action present. When this has been accomplished, then blisters are often of great service, and tend both to prevent a relapse, and to restore the healthy function of the diseased organ. In the form of acute hepatitis which accompanies or supervenes to congestion and torpor of the liver, blistering repeatedly, according to circumstances, is generally beneficial. If, however, blisters are employed too early, and before the inflammatory action has been reduced, they often tend to prolong this action,—and thus a reiteration of the depletory measures is required for its removal. Even in the more chronic forms of the disease, blisters are seldom of much service until local depletions, poultices, and purgatives, have been employed: after these they are generally productive of much advantage.

Setons or Issues.—In the more protracted cases, and where there is reason to suppose, either from the duration of the disease or the presence of enlargement, that organic change exists in the liver,—the insertion of a seton or issue is often necessary. After a discharge has been established from them, poultices applied directly

to be prescribed when the patient is using any of the mineral acids, either in the form of a common drink, or in conjunction with infusions; mischief may result from the practice, without being observed, or its consequences may be mistaken for those of the disease.

over them, and frequently renewed, are beneficial. They should be made much below the region of the liver, and so far anteriorly as to allow the patient to dress and attend to them himself. Like blisters, they should follow the depletory measures already recommended.

Tepid Bathing and Vapour Bath are serviceable during the course of the disease, whether in its active or chronic forms, more especially after depletions have been prescribed. In the chronic forms of the disease particularly, they should be followed by frictions, either with a coarse towel or the flesh-brush, immediately upon coming out of the bath. When a full bath cannot either be procured or taken, the semicupium, hip-bath, or even simple pediluvia, are serviceable. Since I have been in England, I have had occasion to know that the sulphur and chlorine baths have proved serviceable in some chronic cases of great obstinacy, as an auxiliary to a judicious use of deobstruent aperients and alteratives.

Emetics.—Although emetics are extremely serviceable in cases of simple accumulation of bile in the biliary passages, yet where any inflammation of the liver exists, or even a tendency to it, the acute character of the disease is generally increased by their exhibition. In many cases of latent disorder of the liver, where inflammatory action smoulders on in the parenchymatous structure of the organ without occasioning any very manifest symptom of its existence, the action of an emetic, although tending to increase the disease, renders it much more manifest as respects both its nature and relations, and thus, in many instances, leads to the adoption of a decided treatment, which might otherwise have never been resorted to. When emetics are exhibited in hepatitis, they often afford relief for a short time after their operation; but the inflammatory symptoms are soon afterwards increased, if they previously existed; or in the more chronic cases, where they never were very manifest, they become for the first time developed. I have not unfrequently seen cases of active hepatitis, which had been apparently subdued, return with much violence, and those consisting merely of chronic disorder changed to very active disease, after the operation of an emetic. Even after all inflammatory symptoms have been quite subdued, whether in the active or chronic forms of hepatitis, the exhibition of an emetic is hazardous. The object with which they are generally given,—namely, to remove accumulations of bile, as indicated by nausea, bitter taste of the mouth, with clamminess, &c., is much more safely obtained by means of purgatives and cathartic enemata.

Eccoprotics, Aperients, and Deobstruents.—In the more chronic cases of hepatic disease, in addition to the external means already recommended, and particularly after local depletions have been resorted to whenever pain or uneasiness in the region of the liver manifested itself, a gentle aperient pill should be taken at bed-time, and saline laxatives through the day. The best pill for this purpose is that composed of the aloes and myrrh pill and blue-pill, or the blue-pill in combination with the extract of colocynth and small quantities of tartarized antimony and ipecacuanha. Where the chronic disease of the liver is attended with enlargement, it will generally be found requisite to prescribe this remedy every night, the nitro-muriatic lotion being employed externally night and morning; and a weak solution of the sulphates of soda, magnesia, and potash, either singly or combined, may be given in the morning, and, if necessary, again at mid-day, in order to keep up a gentle action in the large secreting viscera and bowels. If, however, a weak solution of these salts should occasion frequent and watery motions, with tenesmus, they may be changed for the solution of cream of tartar in tamarind water, or for the solution of the soda tartarizata, or the tartras potassæ. On many occasions, the factitious Cheltenham or Harrowgate salts may be given with advantage; and the Seidlitz powders may also be taken occasionally. Much benefit will generally accrue from changing, after a few days, the saline substances prescribed, particularly if the exhibition of the eccoprotic pill at bed-time, and the salts through the day, produce any degree of tenesmus. The cream of tartar solution may, however, be given and continued for a longer time, without any risk of inducing this effect. If tenesmus occur, an emollient enema will always afford relief, and the medicines may be intermitted for a day or two.

During this course the diet of the patient should be light, cooling, gently nutritious, and chiefly consisting of farinaceous articles. Spirituous, vinous, and fermented liquors ought to be rigidly avoided, and he should take gentle and regular exercise, according to his strength.

Tonics.—After suitable evacuations have been resorted to, and during the continued operation of deobstruent aperients, the patient's strength ought not to be allowed to sink. While the appetite is but slightly impaired, little more is necessary than a gently nourishing diet, chiefly of farinaceous food; but when the appetite flags, and the energies of life begin to fail, gentle tonics, in the form of infusion, are then generally beneficial. These ought to be made

the vehicle for the saline remedies now mentioned; and by combining, in this manner, the tonics with the saline aperients, we fulfil the double intention of supporting the energies of life while we remove obstruction, and carry off morbid secretions and accumulations. Of the tonics which may be employed, few are more serviceable than the infusion of columba, the cold infusion or the decoction of cinchona, the compound infusion of gentian, or the infusion of camomile flowers. These may be given in various forms of combination, according to the particular circumstances of the case; but they ought never to be resorted to while any lingering disposition to inflammatory action can be traced, nor at any time should they be employed early in the disease.

When it is thought necessary to change from a depletory or antiphlogistic treatment to that which is less depressing to the powers of life, saline diaphoretics, the decoction of sarsaparilla with the sub-carbonates of the alkalies, or a weak infusion of columba or of gentian with the sub-carbonate of soda, soda tartarizata, or the acetate of potash, should be first tried, in the order now enumerated. If these be borne with advantage, and if the functions of digestion and the strength of the patient seem to require their aid, tonics of a more active nature may be given; but these should be exhibited with caution, and generally be combined with the saline substances already recommended. The best adjuncts to tonics given with saline medicines are, the sp. æther. nitr., the tinct. cardam. comp., or any of the preparations of this class. When, with disease of the biliary apparatus, there evidently are accumulations of fæces and morbid secretions in the bowels,—a complication of disease extremely frequent in India,—the tonic infusions now mentioned are very beneficially combined with the compound infusion of senna, and given either without any further addition, or with some salts and the compound tincture of cardamoms and sp. æther. nitr.

Tonics should not be prescribed early in the disease, or before sufficient evacuations have been practised, as they frequently tend to prolong disorder, although their exhibition may be attended with benefit for a short time.

In many of the slighter chronic affections of the liver, the appetite continues unimpaired, and occasionally it is keener than usual. In such cases, the function of digestion is but imperfectly executed, and an unhealthy chyle is generally formed, which, with the quantity of food taken, tends to feed the disease which it is the object to remove. The practitioner, in order to treat the disorder successfully, must be strict in his regulations respecting diet and regi-

men in those cases, and must resort to a steady employment of laxatives or purgatives for a considerable time.

During convalescence, the diet of the patient ought to be a chief object of attention. Nothing tends more to cause the active form of hepatitis to pass into the chronic states of disorder than the indulgence of a too liberal or an improper diet; and nothing, in the more chronic diseases of the biliary organs is more efficient in prolonging the morbid condition, or in converting it into one of an acute form, than similar habits, more particularly if they be connected with the use of spirituous, vinous, or fermented liquors. It may be added as a general observation, that the desire of these indulgences is often combined with, if it does not actually spring from, chronic disease of the digestive organs, more particularly of the biliary apparatus. Hence the necessity of attending to the necessary restrictions respecting diet and regimen, not only during the period of the continuance of disease and convalescence from it, but even ever afterwards: for, where disease of the hepatic organs has once existed, there is a continued tendency to its return thereby induced, whenever the exciting causes are sufficiently powerful for the purpose; and there certainly exists not any more efficient cause in producing this effect than the indulgences of the table, especially when conjoined with the influence of a warm climate and a sedentary mode of life.

Sect. VII.—*On the Treatment of Abscess of the Liver.*

When there exists reasonable ground for believing that abscess of the liver is actually forming, the treatment should be, in some respects, modified accordingly. The symptoms characteristic of abscess already detailed, will materially assist the practitioner in forming an opinion as to the presence of this termination of inflammation of the liver. But it should be kept in mind, that although matter may be actually forming, the inflammatory action which produces it does not cease altogether with this event. In some cases it continues with considerable activity until the abscess either makes its way externally or communicates with some internal viscus; whilst in others it subsides considerably, the circulation exhibiting merely the irritable character and hectic symptoms usually marking the formation or the existence of matter in parenchymatous structures.

Even when we have ascertained that abscess is actually formed, we should endeavour to control, as much as may be in our power, the state of the vascular action, either locally or generally; and

when we find, from the presence of pain, excited state of the tongue, and character of the pulse, that inflammatory action is considerable, we should reduce it by means of small local depletions, and a cooling and febrifuge treatment and regimen. Our object in this mode of procedure is to prevent the extension of mischief, by lowering the cause from which it proceeds, without materially injuring the powers of life. Whilst this object is kept in view, we shall generally proceed as safely as the circumstances of the disease will permit. But the practitioner must be upon his guard against allowing the above means to depress the powers of the system too far: the intention being to diminish morbid action, yet at the same time to preserve power. When it is necessary to diminish the morbid action from which the purulent collection proceeds, the diet and regimen of the patient must receive attention; even at the time the practitioner depletes locally, and prescribes aperients with the view of carrying off the morbid secretions and fæcal accumulations, which always increase disorder when allowed to remain,—he sees the necessity of supporting the energy of the stomach by means of a gently nutritious and cooling diet, allowing the patient no more than the power of his digestive organs can properly dispose of. When these powers fail, he endeavours to rally them by the assistance of gentle tonics combined with refrigerants, such as the nitrate of potass or the mineral acids; knowing well, that if the energies of the vital organs are allowed to sink in the struggle they have to endure against the organic mischief going on in the liver, the purulent formation becomes the more extensive and formidable,—the substance of the organ yielding before it, and becoming farther diseased the more that the vital powers of the vessels of the organ are diminished.

When, therefore, the general tumefaction and throbbing in the hepatic region, which accompany the early formation of abscess, are considerable, and attended with any degree of pain, firmness of pulse, and excitement of the tongue, local depletions should be instituted, and repeated to an extent which the particular circumstances of the case will point out. When these symptoms are present, and the patient has not had rigors, or cold sweats, or formication, or fainting sensations, or a sense of sinking, with anxiety at the scrobiculus cordis, or night perspirations, then we have not sufficient reason to infer the actual existence of abscess, but it may be imminently impending. In this case our practice must be most decided, and should consist chiefly of large local depletions, which must be repeated until the symptoms of coming danger vanish, or as far

as the powers of the system may admit. In those cases where the formation of matter is evident, and the fulness about the margin of the ribs or its vicinity is considerable, the treatment must necessarily depend upon what has been previously done. In these the employment of mercury ought to be entirely laid aside, excepting as a purgative; for attempts to affect the salivary glands with it will generally fail, will merely add irritation to an already irritable pulse, and materially injure the powers of the system—those very powers on which the future recovery of the patient most essentially depends. If the local symptoms, and the state of the pulse and of the system, seem to require it, the application of a few leeches in the vicinity of the tumefaction will be generally serviceable; and afterwards poultices should be assiduously employed, with a view of promoting the external pointing of the abscess.

Mercurial preparations, after the existence of abscess is apparent, with any other view than that of carrying off the morbid biliary and intestinal secretions, are improper; but the nitro-muriatic solution may be employed in any of the modes described, or the nitric acid may be used in a state of very weak solution as the common drink. I have never seen any very marked advantage derived from the nitric acid pushed to its utmost extent in abscess of the liver; but in the form of a common drink it is beneficial, as being gently tonic and refrigerant, and particularly grateful to the patient, especially when it is found not to disorder the bowels, or add to whatever derangement may be existing in them at the time. It may be also used in combination with tonic infusions.

As the abscess advances externally, the tumefaction is changed to a more distinct tumour, which is generally softest at its apex, with an expanded and somewhat hardened base, and when adhesions have formed, some degree of redness is generally remarked; but when the abscess is formed in the concave surface of the liver, although there may be general tumefaction observed in the region of the liver, yet a distinct tumour is very seldom present, unless the abscess be seated very near to the anterior edge of the viscus. In those cases where the symptoms indicate the existence of abscess, from certain signs characteristic of disease of an adjoining part, we are led to conclude that the purulent formation is making its way towards some internal organ, little more can then be done than to palliate the more urgent symptoms as they arise, to moderate febrile action when it becomes at all excessive,—to support the powers of life, without increasing vascular action, and to carry off the morbid secretions, which are apt to accumulate. If, from the

presence of thoracic oppression, dyspnœa, anxiety at the præcordia, with a suffocating sensation, cough, hiccup, &c, there is reason to suppose that the abscess is pointing upon, or forming adhesions to, the diaphragm,—antispasmodics, anodynes, and aperients, are requisite; and on some occasions, especially when the presence of pain, the character of the pulse, and state of the patient, seem to indicate the propriety of the practice, the application of a few leeches over the sternum, or in the direction of the diaphragm, will prove beneficial, particularly if followed by fomentations or hot poultices.

If, in consequence of adhesions formed between the walls of the abscess and the diaphragm, and between this latter and the lungs, the abscess empty itself into the bronchia, little else can be done than to palliate the thoracic symptoms attendant upon the disease, and support the strength of the patient. When abscess of the liver falls in upon the lungs, suffocation is almost inevitable, unless prompt assistance be at hand. The patient should be raised up, and means employed to promote a free discharge of the pus. Hot fomentations should be applied to the chest, and to the region of the liver, and these should be continued until relief is obtained. The attendants should remain in readiness to afford assistance whenever any return of oppression or difficulty of breathing occurs, as these attacks will be both frequent and sudden for several days, until a free discharge is established. In cases of this description, much advantage is generally derived from the exhibition of conium and blue-pill, in the proportion of about two parts of the former to one of the latter; and when the purulent collection has found its way into the lungs, benefit will be obtained from the nitric acid in combination with laudanum, hyoscyamus, or conium. When the tongue remains moist, the expectoration copious, easy, and purulent, and the patient complains of little or no pain, and the pulse is devoid of hardness or sharpness, I have also given the decoction of cinchona, with the acid and the narcotics. During the time this practice is continued, an aperient draught must be given, with the view of keeping up a gentle action upon the bowels. For this purpose, the bitter aperient mixture may be given, either at night or early in the morning. If the patient's strength begins to fail, and if there be night perspirations, and loss of appetite requisite to support the powers of the system, the tonic decoction, with the acid, should not be omitted; and if, in addition to these symptoms, there be also present signs of general exhaustion, with a weak pulse, a cold, clammy state of the extremities, and cold perspirations, or even a state of the system approaching to this, the decoction of bark

should be combined with the sp. ammon. arom., and other warm antispasmodics, in the place of the acid. In cases of this description, particularly when the expectoration is considerable, and no acute or painful symptoms present, the mist. ferri comp. may be given, and, in order to keep the bowels open at the same time, may be combined with the tinct. aloës comp., and the aloes and myrrh pill may be taken every night at bed-time, in a dose sufficient to procure a full evacuation in the morning.

When abscess of the liver is apparently pointing upon the stomach, as indicated by some difficulty of swallowing, by vomiting soon after matters are taken into the stomach; by great thirst, irritability of the stomach, or pumping up of its contents; by the patient reclining either upon the back with the shoulders elevated, or upon the left side, &c., little further can be done than to support the energies of the system while we endeavour to palliate the urgent symptoms. With this view I have usually given, when the irritability of the stomach was most urgent, two grains of opium at bed-time, an infusion of columba with tincture of opium, or the camphorated tincture of opium, and sometimes acids with opiates and antispasmodics; preserving, during the while, a free state of the alvine evacuations, by means of enemata suited to whatever condition the bowels may be in at the time.

The diet requires much attention. It should consist chiefly of farinaceous food, taken in sufficient quantity merely for the wants of the system and the powers of digestion. Tapioca, sago, arrow-root, rice, rice-milk, stale bread, biscuit, bread and milk, bread-pudding, jellies, &c., prepared occasionally with a little wine, according to the circumstances and states of particular cases, furnish the most generally beneficial kind of diet. When a little animal food may be ventured upon, either with a view of supporting the energy of the system, or during convalescence, the lightest kinds of fish and the white-fleshed animals should be selected, but even these should be partaken of only occasionally, and in small quantity.

If abscess of the liver be accompanied with much disorder of the bowels and symptoms of dysentery,—a complication of very frequent occurrence, the disease presents many difficulties to the practitioner. The bowel complaint is generally occasioned in the first instance by morbid secretions, which excoriate and inflame the mucous surface of the bowels, more particularly those parts of them with which they remain in contact for any considerable time. In these cases, mild purgatives are necessary to carry off morbid

secretions, and anodyne and emollient enemata are often required in order to allay the irritation induced in the large bowels. But whilst these measures are being carried into execution, the original seat of mischief must receive attention. When abscess is already formed, the time for expecting advantage from general and local depletions is gone by; nevertheless, if much uneasiness or pain is felt in the region of the liver, or in the abdomen, local depletions may be employed; and if the patient be not very much reduced, they ought never to be neglected when pain is felt in the abdomen and in the course of the colon. The warm bath may be also resorted to, and the application of poultices over the seat of tumefaction in the liver should be persisted in, as answering the double purpose of promoting the external pointing of the abscess, and soothing the existing disorder of the bowels. In these cases also, Dover's powder, given at bed-time, and ipecacuanha injections, are serviceable. The strength of the patient must be attended to, and the diet regulated in the manner already enjoined, during this formidable complication of the disease.

As soon as the abscess has advanced to that state, in process of pointing externally, which shall offer a fair prospect of advantage from giving an artificial exit to the collected matter, the operation for this purpose should not be delayed. But it ought not to be undertaken precipitately, and before the purulent formation has made its way sufficiently near to the external surface of the organ, or before the part at which it points has formed adhesions to the opposite part of the abdominal paries. The practitioner should also be fully convinced, from the state of the tumour in the hepatic region, and from the history of the case, that abscess actually exists, and that the tumour does not proceed from an excessive accumulation of bile in the gall-bladder. Either in consequence of obstruction of the common or cystic duct, from whatever cause, or from the speedy resolution of inflammation or congestion of the liver, great accumulations of viscid bile sometimes form in the gall-bladder, and give rise to a tumour of this organ at the margin of the false ribs and towards the epigastrium, which may be, and indeed not unfrequently actually is, mistaken for abscess of the liver. Care must be taken to discriminate between this pathological condition and the formation of matter in the liver; for it is evident, that if an operation were attempted for the removal of the former condition of disease, death would be the consequence. The accumulation of bile in the gall-bladder, when supervening to congestion of the liver, is often followed, as the formation of matter frequently

is, with a remission of the more acute symptoms, and with slight chills: hence the one is more readily mistaken for the other. In the case of abscess, however, the diffused tumefaction preceding the formation of a distinct tumour, with pulsating pain in the region of the liver; the sensation of sinking, with anxiety and oppression; the night sweats, and clammy state of the surface; and the frequent formications or rigors, are generally, of themselves, distinctive of the suppurative process. In the case of great accumulation of bile in the gall-bladder, the tumour is circumscribed, not preceded by a diffused tumefaction, and is equally soft at its base as at its apex. On the contrary, the tumour proceeding from abscess is at first large and diffused, becoming more circumscribed in its progress, and presenting softness or fluctuation at its apex only, whilst the base is harder and more elevated. These points being duly considered, the existence or the non-existence of abscess may be satisfactorily determined.

On the external Pointing, and the Operation of opening Abscess of the Liver.—It is often a point of considerable importance to ascertain the direction in which abscess of the liver is likely to point, after its existence has been inferred to the satisfaction of the practitioner; but this is not always an easy matter, and, during its early stages, is more frequently one of supposition than of certainty, unless when it evinces signs of pointing externally. When the abscess proceeds externally, the pain, fulness, and distension in the right hypochondrium and epigastrium, complained of previous to the commencement of the suppurative process, for a time increase, and afterwards diminish very considerably, leaving, in the place of the diffused fulness and soreness, a tumour, which becomes more and more circumscribed. When the abscess advances beneath the false ribs, or near the epigastric region, it is generally sufficiently perceptible; but when it points higher up, or more posteriorly, so as to come beneath the ribs, then a bulging out of the hypochondrium is merely remarked, with fulness and distension of the intercostal spaces, and pain and soreness limited almost entirely to one small spot. In the great majority of abscesses, the direction is to the superior and exterior surface of the liver, and hence their communication so frequently with the diaphragm and lungs, when they fail of pointing more externally. But even in such cases, adhesions to the peritoneum opposite to the seat of abscess are not always formed; for the abscess may advance to the very serous surface of the viscus without coagulable lymph being effused upon this surface in a degree sufficient to attach it to the adjoining parietes of the

abdomen. When this is the case, although a circumscribed tumour may point outwardly, yet there will seldom be much redness of its external surface,—an appearance which always indicates that adhesions have formed, or are far advanced in the process of formation; and when this is observed, with diminution of the surrounding fulness which accompanied the formation of abscess, and with fluctuation of matter in the tumour, then the operation may be undertaken with every prospect of success.

In many cases, nearly the whole right lobe is one immense abscess; yet there may not be much destruction of the internal structure of the organ, it being impacted around the parietes of the purulent collection. In some cases, however, it is otherwise; and along with great inflammation of the substance of the organ, there is also much softening, and a breaking down of the tissue amid the purulent matter. In this case, it is by no means likely that an operation, performed with a view of allowing the escape of the collected matter, would prove beneficial; but in the former, the removal of the contained matter furnishes a rational ground for expecting relief.

When the liver is considerably enlarged in the early stage of inflammation of its internal texture, the formation of abscess is often with difficulty prevented; and when it is felt below the ribs, with general fulness over the hopochondriac and epigastric regions, the constitutional symptoms already detailed being also present, we may consider that suppuration is going forward, although abscess has not actually arrived at its height. But as long as there are tension, hardness, and tumefaction in the region of the liver, we may be assured that the suppurative process is not yet complete. As soon, however, as the abscess is completely formed, the pain and general tumefaction are diminished; the liver, in some cases, seems to shrink into its natural position, leaving merely a more or less distinct tumour near the centre of the general tumefaction when the abscess points externally, unless the purulent collection be so extensive as to fill the greater part of the abdomen, as I have observed in several cases.

As long, therefore, as there are pain and tenderness felt in the region of the liver, with an undefined tumefaction, and neither a circumscribed nor soft fluctuating tumour is yet formed, an operation undertaken with the view of giving exit to the purulent matter would be premature. But when the pain and general fulness are diminished and replaced by a distinct tumour, without acute pain, soft and fluctuating at its apex, or with a soft elasticity

and slight lividity or redness of the surface, and a somewhat hardened and elevated base, indicating that the purulent matter has found its way to the external covering of the liver at the tumid part, and that the liver has there formed adhesions to the opposite part of the abdominal parietes,—the operation may be undertaken with every expectation of success. If it were performed during the former condition of disease, the operator would have to cut deep into the substance of the organ before the purulent collection could be reached, and would run the risk of almost immediately destroying the patient from the hæmorrhage consequent upon cutting deep into so vascular an organ as the liver is, with the additional hazard of finding no adhesions formed between the side and the seat of disease. This is a point of great importance in practice, and should be most particularly attended to, as a mistake of the kind now alluded to would prove fatal. I have seen several instances where premature operations would have been attempted had they not been prevented, and I fear that others have been actually performed. The practitioner should also endeavour to satisfy his mind that adhesions have formed between the surface of the diseased organ and the opposite part of the abdominal parietes, before he attempts the operation. For if the abscess be cut into, and the purulent matter evacuated, whilst no adhesions exist, the liver, collapsing after the evacuation of the contained matter, would recede from the opening made in the abdominal parietes, and the discharge from the abscess would be effused in the peritoneal cavity.

Being satisfied that the abscess is sufficiently advanced for the performance of the operation, and that it has adhered to the external wall of the abdomen, from the distinct character of the tumour, from its soft, elastic, and fluctuating apex, and its sometimes hardened and somewhat elevated base, and from the inflamed or livid appearance of its surface, the surgeon should not hesitate in the performance of the operation. I do not recommend it, however, to be attempted by means of the trocar, as is usually done; and for the following reason :—The pus which is formed in abscess of the liver is often full of large flakes, and sometimes contains large coagulated clots of a cheese or curd-like matter, which will not pass through the canula, the more fluid portions only coming away. These clots remain, acting as foreign substances in promoting continued suppuration of the organ, and febrile excitement of the system. I have been, therefore, always in the habit of performing the operation without the trocar, and in the following manner :—having made the external incision large, and with caution,

until the peritoneum is fully exposed, the fluctuation of the abscess will be distinctly felt. An abscess-lancet should then be introduced, and the tumour laid open to the full extent of the external wound which ought to be from two and a half to three inches in length. Care should always be taken that the opening extend not beyond the limits of the adhesions which have been formed. The purulent collection being fully evacuated, the cavity should be filled with lint, which gives a mechanical support to the evacuated parts and the wound dressed with compresses and bandages in the usual way.

The treatment, after the operation, will depend neccessarily upon the circumstances of the case. The wound must be dressed as before, from time to time—at least once or twice daily; the collected matter allowed to escape, and compresses and bandages properly applied. After two or three days the discharge will be diminished, when the quantity of lint introduced into the cavity may be lessened, and in a few days entirely omitted, the external incisions only being kept open, and compresses and bandages applied, until the discharge entirely ceases. The bowels should be gently acted upon, and the strength of the patient kept up under the disease by means of a light, nutritious, and chiefly farinaceous diet, taken in moderate quantity. If the powers of the system seem to require tonics, they should be given, and varied according to the circumstances of the individual cases. The compound infusion of gentian, the infusion of columba, the cold infusion, or the decoction of bark, with astringents, stimulants, antispasmodics, &c., such as the mineral acids, the sp. ammon. arom., the sp. æther. nitr., the tinct. camph. comp., and any of the tonic or cardiac tinctures which the peculiarities of the case may require. Sometimes it will be necessary to allow the patient a few glasses of wine through the day.

When abscess of the liver finds its way into the colon, or stomach, the treatment must be regulated according to the principles already inculcated. The most urgent symptoms should be allayed by medicines suited to their nature, and the energies of the digestive organs kept up or promoted, as circumstances may require. If the powers of life begin to flag they must be rallied, and morbid accumulations in the bowels should be carried off by means of aperients combined with tonics, and by appropriate enemata.

Sect. VIII.—*On Hydatids of the Liver.*

In the course of my pathological inquiries I have occasionally observed hydatids in the substance of the liver, under its proper

coat, or between it and the peritoneal covering. The concave part of the organ is most frequently the seat of these parasitic growths. They vary in size from that of a millet seed to the usual bulk of the head of a full-grown fœtus. When productions of this latter size, or of large dimensions, are formed, resembling hydatids, the existence of hydatids within them should be ascertained, and if they are found, their independence of the cysts containing them should be proved; for it is not very uncommon to find simple cysts mistaken for hydatids; and even when hydatids are present, the cyst containing them may be viewed as the principal hydatid. In one case the hydatid, which was of very large dimensions, floated in a quantity of whey-coloured fluid, contained in a cyst which was evidently formed from the development of the hydatid, and the effusion of the fluid, between the proper covering of the liver and its peritoneal envelope. In the majority of instances, however, the large hydatids are observed to contain a number of smaller formations of the same kind: the largest are often broken, as if they had been burst by the development of those within. The cyst containing them generally presents a fibrous structure, and in some cases a fibro-cartilaginous appearance. In some cases the enveloping cysts form adhesions to adjoining viscera, and afterwards open and discharge the contained hydatids into them, in a somewhat similar manner to the opening of an abscess. Thus hydatids of the liver have been discharged into the colon, duodenum, stomach, or peritoneal cavity.

With respect to the *Symptoms* indicating the presence of hydatids in the liver, or connected with it, but little can be advanced. In the early stages of their growth they are seldom indicated by symptoms which are in any way peculiar to them. There are frequently observed great paleness and sallowness of the countenance, shooting pains in the region of the liver, without any marked disturbance of the pulse, which is more usually weak, soft, and languid, than the contrary. When they become more fully developed, so as to increase the bulk of the organ, then a sense of weight, oppression, and suffocation, is felt, sometimes with a dry cough; and a tumour becomes evident at or near the epigastrium, without much general tumefaction of the right hypochondrium, and region of the liver. The tumour is sometimes unequal, obscurely fluctuating, and soft; and it generally presents neither the discolouration of surface nor the hardened base remarked during the progress of external pointing in abscess of the organ. The tongue also is very different from what it usually is in abscess: it is pale, and

seldom loaded or dry. The pulse is not accelerated unless the cyst becomes inflamed, or forms adhesions to adjoining parts, when the signs of inflammatory action begin to manifest themselves.

On the *Treatment* of hydatids of the liver, I have not much to advance. If the cyst containing them were to form adhesions to the parietes of the abdomen, then advantage might be derived from an operation similar to that resorted to for the removal of purulent collections in the liver, and performed in a corresponding manner, but with still larger incisions, and a freer outlet for both the hydatids and the surrounding fluid contained in the cyst; but such adhesions seldom or never take place. When the tumour is large, with fluctuation, and the case of the patient urgent, I would recommend the operation to be performed, rather than allow the patient to sink without an effort calculated to produce any benefit. Urgent symptoms must be combated as they arise, or palliated according to the characters they may present, and the state of the patient. The energies of the digestive functions, and, through them, of life itself, should be supported, and morbid secretions and accumulations carried off from time to time. When inflammation supervenes, then the antiphlogistic treatment must be adopted; but in this case little hope can be entertained of any permanent advantage, unless the inflamed cyst adhere to some part of the abdominal parietes, and give rise to appearances which shall lead to the performance of an operation for the removal of its contents. When inflammation thus supervenes in the cyst containing the hydatids, or in the adjoining part of the liver, the disease very closely resembles abscess seated in the concave surface of the organ, and is generally treated as such; indeed it is almost impossible, unless from the early history of the case, to distinguish between both these morbid states; and, even after the most attentive observation, no precise idea can be formed upon the subject, the hydatid growths generally assuming more or less of the features of the more chronic cases of abscess of the liver, excepting only the states of the pulse and tongue as already alluded to, and the dysenteric disorder frequently accompanying the latter disease.

SECT. IX.—*Precautions on Change of Climate for the Adoption of those subject to, or recovering from, Diseases of the Biliary Organs.*

Much of the present subject has already been anticipated in the observations respecting change of climate from a warm to a cold country, for complaints of the stomach. What is there stated is

fully applicable to those who proceed from India to Europe, after having suffered from hepatic disease, or who have acquired a liability to such disease from their residence within the tropics. With respect to diet, regimen, and clothing, there is scarcely any thing at present to offer in addition to what has been already advanced. The necessity of conforming strictly to the injunctions laid down as to this subject, during the time of passing to a colder climate from a warm one, and for a very considerable time after the change has been effected, will soon become apparent to those who are at the time suffering in any degree from hepatic diseases. Those who have acquired merely the tendency to those maladies, or who are subject to functional disorder only of the biliary organs, will generally at first experience but little inconvenience from the change, and will therefore consider constraint of any kind, whether of diet or regimen, very unnecessary, and look upon a return to a colder and more salubrious climate all that is necessary towards a restoration of health. This is doubtless correct in very many instances; but it is by no means so in all. On the contrary, many who have either suffered only from functional disorders of the liver, or who have acquired merely a tendency to them during their residence in the east, or within the tropics, have been attacked with active disease soon after their return to Europe; and some who have suffered more seriously in these regions have had their complaints aggravated after a short residence in England, although they had been benefited during the voyage to Europe. This result of change to a colder climate does not, however, proceed altogether from the temperature, or from the state of the seasons, but, in a great measure, from the neglect and imprudence of the patient. Frequently, however, the influence of a colder atmosphere is materially prejudicial, particularly in constricting the vessels on the external surface, in determining an increased flow of blood to the large internal viscera, and promoting congestion and obstruction of those organs which have been weakened by previous disease or the influence of climate. In order, therefore, to counteract this effect of temperature, warm clothing should be adopted, and every part of the body, especially the lower extremities, kept warm, the invalid carefully avoiding exposure to cold, particularly to cold combined with moisture, and to the night air.

Another very frequent result of change from a warm to a cold climate is a diminution of all the secretions of the body, particularly the secretions of the skin and of the liver. Hence a plethoric state of the vascular system speedily supervenes in many cases;

and if the external surface of the body and surface of the lungs be even momentarily subjected to the influence of increased cold, particularly if combined with moisture, after the circulating fluid has been elicited to these parts by hot rooms and crowded assemblies, the great mass of blood is thrown upon the internal viscera, which, if not relieved by a free secretion, become the seat either of congestion or of inflammation. Hence it is that attacks of hepatitis or of dysentery so frequently supervene upon sudden changes from a high to a low temperature. In order to guard against this, the precautions just mentioned should be strictly observed; the diet should be moderate, light, and easy of digestion; and the patient should abstain entirely from the use of strong wines: above all, he should attend to the state of his bowels. The functions of this part of the economy should be promoted, whenever they seem to flag, by means of gentle aperients or tonics combined with small doses of deobstruent salts. For this purpose, a pill, consisting of one grain of blue-pill, two of the aloes and myrrh pill, and one of hyoscyamus, may be taken in the evening for some time; and a wine-glassful of a mixture consisting of equal proportions of the compound infusions of gentian and senna, with some neutral salt, and a little compound tincture of cardamoms, at night or early in the morning.

Where there has been previous disease of the liver, with enlargement of the viscus, a large plaster, formed of equal parts of the emplast. picis comp. and the emplast. ammon. cum hydrarg. should be placed over the right hypochondrium, and worn for several months; whilst the Cheltenham waters, the factitious Carlsbad waters, or any of the neutral salts much diluted, may be taken through the day. In cases of this latter description, invalids, upon their return to Europe, will often find great advantage from drinking daily a decotion of the leontodon taraxacum, to which may be added some of the sub-carbonates of soda or of potash, with a little of the sp. ammon. arom., or sp. æther. nitr., or of both, as circumstances may indicate, the pill already mentioned being taken at bed-time.

Patients who are convalescent from any of the diseases already treated of, will generally be benefited by a change, for a longer or shorter period, to a purer air and cooler temperature than are generally to be enjoyed within the tropics. Great benefit will often be derived from a sea voyage, and the enjoyment of a pure sea air. But in order to obtain the full advantages of these changes, due precautions ought to be observed during the time of their being

effected. They should be made in such a manner as to ensure a very gradual diminution of temperature, and every comfort necessary to the state of the invalid. Patients who have suffered from hepatic diseases have generally a very marked predisposition to pulmonary disorders, on sudden vicissitudes of temperature, attended with a return or aggravation of the original malady. Thus it frequently is observed, that individuals returning to Europe, from India or other warm climates, with functional or organic disease of the liver, become extremely liable to disorder of the respiratory organs. This, in the majority of instances, arises from the extension of the original malady to the pleura and lungs, the invalid thus becoming the subject of hepatic disorder complicated with disease of the thoracic viscera. This complication is generally the consequence of imprudent exposure to cold after the body has been overheated, to the impression of cold night air upon coming out of warm and crowded rooms, and of cold or damp applied to the lower extremities. It not unfrequently also arises from exposure of an opposite nature, but equally injurious in their effects,—namely, to the breathing a very warm and close atmosphere immediately upon coming out of a cold and dry air. Many of the consequences proceeding from changes of this description have been imputed to other sources, and hence the real cause of mischief has been too frequently overlooked. The invalid, so susceptible to disease, comes from a cold and pure air into a heated room, and after remaining there for some time, until the constricted state of the extreme vessels on the surface of the body and in the lungs is overcome, and reaction of the vascular system, with all its consequences of free secretion and exhalation, induced, again rushes into a cold and dry air, occasioning thereby a constriction of the secreting surfaces, and a determination of the blood, which had been elicited to the external surface of the body, to the large internal viscera, there to induce congestion, and ultimately inflammatory action. It is often difficult to say which of these exposures is most detrimental to the system; but that either the one or the other, according to the state of the individual, proves prejudicial, cannot be doubted.

The same causes, even when they fail of inducing pulmonary disease,—to which long residence in a warm climate predisposes all Europeans,—generally aggravate hepatic disorder when it is already present, or convert functional disorder into inflammatory action and organic change. In order to overcome this tendency to more severe and more complicated disease by removing to a cold country from a warm climate, the invalid should be most careful in making the

change as gradually as possible,—in preserving a free state of the cutaneous function,—in avoiding all hurtful exposure to cold and moisture,—in living temperately as respects both eating and drinking,—and in keeping up a gentle action on the bowels and on the large secreting organs placed in the abdomen. Beyond this the invalid or convalescent should not attempt to proceed. When these means are not serviceable, or seem insufficient for the extent and severity of his maladies, he should resort to medical aid, should make a judicious choice of his physician, and be entirely guided by the instructions which he will receive from him.

BOOK IV.

ON THE DISEASES OF THE SPLEEN, PANCREAS AND INTESTINES.

THERE is no class of diseases which requires more careful observation during the life of the patient, and minute research after death, than affections of the bowels, as they occur in India, and in warm climates generally. In many localities they constitute, both in their simple and complicated forms, the chief class of diseases, and are frequently attended with the greatest danger. The observations I shall offer upon this class of diseases will be chiefly the result of my own observations; but it is necessary to premise some remarks upon the disorders of the spleen and pancreas as they present themselves to our notice, particularly as they occasionally are complicated with the diseases already considered and those of which I have now to treat.

CHAPTER I.

ON THE DISEASES OF THE SPLEEN, PANCREAS, AND INTESTINES.

THESE diseases are not generally very prevalent in warm climates: those of the pancreas, perhaps, not more so than in temperate countries. Affections of the spleen are prevalent only in particular districts of country and situations. In the Madras Presidency, they are not very frequent, unless in neglected or improperly-treated cases of ague or remittent fevers.

SECT. I.—*On the Diseases of the Spleen.*

Inflammation of the spleen, although not of very frequent occurrence in India, is, I believe, a common disease in Bengal Proper; it is, however, rare in the Madras Presidency. In some situations it is endemic, more particularly in low swampy places where agues abound; and in such districts the inflammatory action which supervenes is generally of a slow or chronic nature, and attended with congestion and obstructed circulation in the viscus. In some cases the enlargement which takes place is very great,—the spleen seeming to fill nearly the whole of the left hypochondriac and epigastric regions. When inflammation of this organ presents acute or subacute symptoms, it almost always is seated in its fibrous covering, and is attended with more or less pain, and a well defined enlargement, which, however, while the acute symptoms continue, is seldom very great.

The most frequent states of organic change of the spleen are the following:—1st. Enlargements of this viscus. The enlargements sometimes are to a very great extent, the spleen weighing ten or twelve pounds, and yet no very sensible alteration can be detected in its substance by the unassisted eye. Frequently, however, its structure is at the same time much changed, its colour being much deeper, its consistence greatly diminished, and rendered more friable, so as scarcely to admit of examination without falling to pieces. Its external membrane is also often torn with ease: sometimes it is thickened, more vascular, and occasionally cartilaginous in parts.

2d. It is, in some cases, ossified in various places, and in others covered with large patches of coagulable lymph and albuminous concretions. In such cases, it frequently adheres to the adjoining surfaces and viscera. 3d. Its internal structure frequently contains purulent collections, sometimes apparently unencysted, and flowing through its substance; at others, enclosed in one or more distinct cysts. It also is subject to tubercular formations, and to hydatids. 4th. The spleen is occasionally found smaller than natural, and dry and shrivelled; but this is comparatively a rare occurrence in warm climates. 5th. Instances have occurred wherein it has been ruptured, from the congestion of blood to which it has been subject in the cold stage of an ague. And, 6th. Its internal substance has been occasionally found reduced to a grumous and pultaceous mass.

The *causes* of diseases of the spleen are chiefly those inducing intermittent and remittent fevers. It is seldom observed as a primary disease, and seems to result, in a great measure, from the deficient energy of the system, particularly of the digestive organs. It is frequently observed as a sequela of agues, in low, marshy, and moist situations upon the sea-coast, more particularly in wet and warm seasons, and where there is a deficiency of spring or river water. In some places within the tropics, where the water consists entirely of rain-water, preserved in tanks, situate in low, marshy grounds, diseases of the spleen are endemic. In countries far inland, and considerably above the level of the sea, these diseases are comparatively rare.

When the spleen is simply enlarged or tumefied, without inflammatory action being present, little inconvenience or pain is felt by the patient, even although the enlargement may be to a very great extent, the tumefied spleen passing across the umbilicus to the right iliac region, and filling nearly the whole abdomen. In these cases, the congestion in the spleen is usually the consequence of protracted agues, more particularly when they have been injudiciously treated. In cases of this description, the nature and progress of the disease are readily perceived, as the margin of the tumefied viscus can be readily traced, and the extent of enlargement very nearly ascertained.

If the spleen be inflamed in a more or less active form, a dull, heavy, and aching pain is felt in the left hypochondrium, with occasional lancinating pains in the same situation, observed particularly upon quick motion, and after a full meal. In the more acute cases, there are chills or rigors to which succeed pain, nausea, and occa-

sionally vomiting, with thirst, tension, colicky pains, and impeded respiration. The tongue is generally white, foul, and excited; the pulse somewhat accelerated; the bowels constipated or irregular; the urine high-coloured, and frequently voided; and the skin sallow, dusky, and rather hot. In the sub-acute and chronic cases of inflammation, several of these symptoms are either altogether wanting, or are so slight as frequently to be overlooked. The spleen is generally tumefied to a considerable extent, at the same time that its proper coat is inflamed; but the tumefaction is never so great as in the cases of simple congestion of the viscus, already alluded to. Sometimes the enlargement is scarcely to the extent of allowing the spleen to be felt beneath the left false ribs, even in the most acute cases of the disease.

Treatment.—In cases of simple tumefaction of the spleen, unattended by inflammatory action, a general laxative system should be adopted to carry off the morbid secretions always present in such cases; at the same time attention should be paid to uphold the strength of the patient, and to give energy to the digestive organs. Full doses of calomel at bed-time, followed by the bitter aperient draught, or the pulv. jalap comp. in the morning, may be continued until the motions have assumed a healthy character. It must, however be remarked, that in giving calomel in these doses, it is not with the view of producing the specific action of mercury upon the constitution, but purely as a purgative; and it is selected as such because it acts more decidedly upon the vitiated secretions of the bowels than any other medicine, and prepares those secretions for removal by the ordinary purgatives recommended. I am particularly desirous of directing attention to this point, from the circumstance of my views of the treatment of diseases of the spleen, having been either misrepresented, or not clearly understood by an author (Mr. Twining), who has lately written on the diseases of Bengal; and who, from insufficient extracts of my opinions, has apparently been led to draw inferences which are not warranted, but which, I fear, have misled many as to the views I entertain upon this subject. After purgatives have been duly employed, the nitro-muriatic acid lotion should be applied over the region of the spleen, and the nitric acid may be given internally at the same time in the patient's drink.

I cannot too strenuously recommend this treatment in diseases of the spleen, especially the nitro-muriatic solution. But in order that this latter may be beneficial, a continued and well-regulated course of purgatives, and afterwards of aperients combined with

tonics, should be adopted. In cases of congested or tumefied spleen, we must support the powers of the system, while we purge the bowels by giving the blue-pill and the aloes and myrrh pill every night, and a full dose of calomel occasionally. But the purgative draught should be continued every morning until the disorder disappears. In cases of this description, the best purgative is that composed of the compound infusions of gentian and senna; to which may be added some of the bitter purging tincture, and a little of the sp. ammon. arom., or of the sp. æther. nitr. If we should find it requisite to act more energetically upon the bowels, this draught may be repeated at mid-day, or a drachm or two of the sulphate of magnesia, sulphate of soda, or sulphate of potass, may be added to it.

Hæmatemesis, with a dark, grumous state of the stools, is not an unfrequent concomitant of congested spleen. In cases of this description, the treatment already recommended need scarcely be even modified; but the nitric acid drink is here especially indicated, with the external use of the nitro-muriatic acid lotion. If pain be present, with a plethoric state of the habit, leeches applied over the region of the spleen or stomach are evidently necessary; but in cases of this kind, no means should stand in the way of active and continued purging, as recommended, promoted by the injection of active cathartic enemas.

When inflammatory action is going forward in the spleen, leeches should be applied upon the left hypochondrium, and the local bleeding carried as far as the condition of the patient, and urgency of the symptoms, indicate. After the leeches have ceased bleeding, a cloth, moistened with the nitro-muriatic solution, should be applied upon the splenic region, and covered with a hot poultice, which, with the moistened cloth, ought to be frequently renewed until the acute symptoms subside, when simple sponging with the solution night and morning will be all that is necessary. In addition to these means, the use of purgatives and tonic aperients must be persisted in until the disease is removed and the motions acquire a healthy appearance, when change of air and regular exercise should be adopted.

During the treatment of diseases of the spleen, the diet and regimen of the patient should be carefully attended to. The patient's food should be light, nutritious, and in no greater quantity than his digestive organs can well dispose of. Vinous and fermented liquors should be avoided, and his drink be of the most mild and cooling description. He ought to take regular exercise in the open

air, as far as his strength may permit; and his clothing should be warm, and suited to the vicissitudes of the atmosphere and sudden changes in its temperature.

SECT. II.—*On Diseases of the Pancreas.*

The situation of the pancreas renders it a difficult matter to obtain any knowledge even of the existence of disease of this viscus during the life of the patient. We frequently, however, find, upon examination of bodies after death, very manifest changes in its organisation and size. These chiefly consist of simple enlargement, of enlargement with scirrhous hardening, and of cheesy tumours in its substance. But whether these lesions are always the result of slow inflammatory action, or of some change in the nutrition of its substance, or of both, is a question which admits not of a ready solution. Our knowledge, also, respecting the state of its function, or the qualities of its secretion during these states of disease, is equally defective.

The pancreas is sometimes found greatly enlarged, and in some degree hardened; occasionally it is reddened and evidently inflamed in parts, and this appearance may be remarked either alone, or conjoined with enlargement of the various lobules of the gland, and, in a few cases, with small collections of pus formed in the interlobular cellular substance: at other times it is tuberculated and irregularly enlarged; on some occasions enlarged and scirrhous, the texture of the organ being traversed by gristly bands, and a reticulated, firm structure, with a glairy fluid filling the interstices. Yet in these cases the patients presented only the symptoms of chronic inflammation of the liver, or at least they were considered as suffering under that disease. When the pancreas is much changed in its organisation, and much enlarged, it often presses upon the common duct, and either impedes or entirely obstructs the flow of bile into the duodenum. In this case, the derangement is generally assigned to the biliary apparatus, owing to the sallow countenance of the patient, and the jaundice which frequently supervenes from the obstruction of the ducts. In some cases, the enlargement of, and the tuberculated and knotty tumours formed in, the pancreas, may be mistaken for scirrhous pylorus; and it is often a matter of difficulty to decide which of the two diseases is actually present. In some instances, however, attention to the manner in which the function of digestion is performed, and to the presence of sickness,

and the period after a meal at which nausea or vomiting supervene, will guide the practitioner to a correct diagnosis.

In cases of diseased pancreas, inflammation often supervenes either in the viscus itself or in its surface or vicinity, uniting with it the pylorus, duodenum, biliary ducts, and even the gall-bladder, by firm adhesions. In these instances, if the diseased state of the pancreas was not primarily the result of inflammatory action, this action must have supervened in the progress of the disease, otherwise the consequences of inflammation could not have existed. In such cases the pancreatic disease may be viewed as having supervened primarily; but it is probable that, in the great majority of instances where the pancreas has been found diseased, it has been consecutive to chronic disorder of the stomach, duodenum, or liver. I have found it consequent upon very severe dyspepsia, combined in many instances with an irregular and morbid state of the alimentary canal; in others, it seemed to have supervened to obstinate disease of the biliary organs.

Whether chronic inflammation of the mucous surface of the duodenum may be propagated along the ducts to the pancreas, as some pathologists suppose, is a question which is more readily proposed than answered: I believe that it may possibly supervene in this manner, but that it very seldom occurs. If inflammation actually extend from the internal surface of the duodenum along the pancreatic duct to the pancreas, it must still more frequently be propagated along the biliary ducts, and transmitted to both the gall-bladder, and to the liver itself. I look upon inflammation of the pancreas as taking place more as a consequence of disorder of its functions, when it occurs primarily, than as proceeding from the extension of inflammation from the alimentary canal along its duct. When it is a consecutive disease, it is induced most frequently from inflammation having extended from the concave and posterior part of the liver, or from the gall-bladder and biliary ducts, and perhaps occasionally from the external surface of the duodenum. In a great many of those cases wherein this viscus has been found diseased, the more immediate cause must be referred to previous disorder of the function. But it is almost impossible to determine when such disorder commenced; as it is generally so much the result of, and complicated with, the more obstinate forms of dyspepsia, and functional and organic disease of the liver, as to put it out of the power of the most discriminating observer to ascertain what share of disorder ought to be attributed to this organ.

When, however, the functional disorder has induced either

organic change, or acute, sub-acute, or chronic inflammatory action, attentive observation and much experience may lead the practitioner to dread the existence of disease of the pancreas, although he will seldom be enabled, unless there be considerable emaciation and well-defined symptoms present, to form any idea as to the particular kind of disorder existing. If pain be felt, it may proceed either from the posterior and inferior edge of the liver, or from the gall-ducts, or from the duodenum or pylorus, or from the pancreas itself, or from any two or more of these parts. If enlargement be evident, it may be the consequence of thickening or scirrhus of the pylorus, accumulations in the colon, or morbid duplicatures of this viscus, or of enlarged glands at the root and in the folds of the mesentery, or of any of the organic changes of the pancreas enumerated above. Even when disease of the pancreas is present, it is seldom met with as a simple and uncomplicated malady. There is seldom an opportunity of investigating the *post mortem* appearances of acute disease of this organ, except in cases which terminate fatally, either altogether from disorder existing elsewhere, or from the complication of such disorder with the pancreatic disease; and even in the majority of those cases, we seldom observe more than the remote consequences of the disease which had been going on in the pancreas, and are still left much in the dark respecting the nature of the earlier changes induced in the structure of this viscus.

Diseased pancreas is not indicated by any very acute symptoms. The patient often feels an aching, heavy, or dull pain in the back, beneath the scapulæ, and deep in the epigastric region. This is often mistaken for chronic disease seated in the posterior part of the liver. When such mistake is made, it cannot be of any very material consequence as respects the treatment, as the means of cure are nearly the same in both cases. There is generally a sensation of compression, internal heat, constriction, and anxiety at the precordia and deep in the epigastrium. The tongue is generally white, and its papillæ excited, with dryness of the mouth and fauces, and occasionally there are eructations of a viscid fluid disgorged from the stomach. There are also generally loss of appetite, nausea, and occasionally vomiting and hiccup, with great emaciation in the advanced states of disease. The skin is usually hot and dry, and the pulse somewhat accelerated. The bowels are either costive, or a slight diarrhœa is present, characterised by mucous and glairy stools.

As disease of the pancreas is seldom met with in a simple or

uncomplicated form, being usually accompanied with inflammation of the liver, stomach, or duodenum; so it must be expected that the symptoms now enumerated will be attended with, and, in a great measure, obscured or entirely concealed by, the symptoms characteristic of these diseases. Indeed, the pancreatic derangement very seldom becomes apparent, when existing in any of these states of complication; for it is generally consecutive to the disease of the adjoining organs, and is much less acute, and less distinctly developed, than they are.

As respects *the causes* of disease of the pancreas, I have nothing to adduce with confidence. Its most frequent exciting causes seem to be, protracted or improperly treated disorders of the stomach, duodenum, and liver, and the causes already assigned for these maladies. The habitual use of heating and irritating articles of diet, and of spirituous liquors, may have some share in the production of disease of this viscus.

Of *the treatment* of diseased pancreas, little also can be stated with confidence. Antiphlogistic remedies should be resorted to. Local depletions, counter-irritations by means of blisters, setons, or the use of the tartar-emetic ointment, and cooling purgatives, seem best suited to the disease of this viscus; but the remedies must necessarily be chosen with a strict reference to the particular complication which it presents in practice. In the majority of instances, deobstruent aperients given internally, whilst the nitro-muriatic wash is used to the trunk of the body, will be productive of some advantage, and at the same time tend to remove the disorders with which diseased pancreas is most frequently complicated, more particularly after local depletions have been carried sufficiently far. I do not recommend mercurials to be employed when the pancreas is obviously diseased, unless with a view to its purgative effect.

CHAPTER II.

ON INFLAMMATION OF THE SMALL INTESTINES.

INFLAMMATION of the small intestines may be seated chiefly in its mucous or villous tunic, or it may extend no further than to cellular tissue immediately subjacent to it, and connecting the villous to the muscular coat. In these cases, more particularly the former, the inflammation is generally slight; and if it advances no deeper, the disease is soon removed by judicious treatment. In many cases, however, especially when it is also seated in the submucous tissue, the inflammation extends through the whole cellular texture uniting the various membranes of which the small bowels are composed, or it attacks the bowel to this extent at first. When the disease commences in the mucous coat, and extends to the substance of the bowel, it becomes much more acute and dangerous. When acute enteritis is met with in warm climates, more particularly in India, it generally advances in this manner; but it also attacks, although more rarely, in a primary and more immediate manner, the substance of the bowel, forming what has been usually denominated phlegmonous enteritis. Even when it seizes upon the substance of the viscus, it seldom invades, at the same time, the free or serous surface of the intestinal peritoneum; but it soon extends itself to this membrane on the one side, and to the mucous coat on the other, so that the various tissues of which the bowel is composed at last become the seat of disease. Inflammation of the small intestines seldom commences in their peritoneal surface, unless from the extension of disease from some other organ.

SECT. I.—*On the Pathology of Inflammation of the Small Intestines.*

Inflammation of the small intestines, as observed in warm climates, is frequently the consequence of morbid secretions and the accumulation of mucous sordes upon the internal surface of the bowel, assisted by the influence of the usual exciting causes of inflammation of internal organs, such as exposure to night air, to

chills and dews, or to currents of cold air when under perspiration. The use of stimulating, acrid, and irritating matters, especially intoxicating liquors, so much indulged in by European soldiers in India; the use of improper substances, particularly the acerb and indigestible fruits which are so acceptable to young persons on their first arrival, are also frequent causes of enteritis; and particularly in certain conditions of the system after a long voyage, when the secretions of the large bowels are in a morbid state, or when the secretions poured out from the mucous surface of the alimentary canal are in any degree vitiated.

When enteritis proceeds from exposure to cold, from wet clothes, sleeping in the open air, and the influence of a chilling atmosphere or currents of air—causes not uncommon among troops on service—the inflammation sometimes attacks the substance of the intestines, or their peritoneal coat without any complication; but, in general, it is accompanied by morbid secretions of the bowels or diseased liver.

Enteritis, however, most frequently supervenes in the mucous surface, and gradually extends itself through the substance of the intestine to the peritoneal covering; but this latter part seldom becomes the seat of the inflammation unless consecutively; and even in the more chronic cases, the disease of the interior coats may have proceeded to ulceration, and the ulcerations made their way through the serous coat, before inflammation has been induced in this membrane, particularly in its external or unconnected surface. When inflammation is observed on the external surface of the small intestines, in warm climates, and more particularly in India, according to my experience, the coats beneath are almost always in a state of active disease; and in the majority of cases, if coagulated lymph have been formed on the external surface, then ulceration within may be considered as having advanced nearly to its utmost limits, unless the peritoneal disease has supervened in consequence of the extension of inflammation from adjoining viscera. I scarcely remember a single case, excepting those of consecutive peritonitis, of inflammation being present in a very decided form in the peritoneal coat of the small intestines, and attended with the exudation of coagulable lymph, where there were not found, upon examination of the interior tunics, still more marked appearances of disease, and where either extensive ulceration, great softening of the texture of the coats, or actual sphacelation of the mucous and cellular tissues internal to the peritoneal covering, were not observed. Not unfrequently, indeed, all these appearances are detected in the same case, in different parts of the tube. When, however, the peritoneal

inflammation has extended itself to the intestines from the liver, cæcum, colon, or some other viscus, or has supervened in consequence of the escape of foreign matters into the peritoneal cavity, the internal tunics of the small bowels are generally free from any further disease than an increased vascularity in some places, and softening of their tissue. These points are important as regards the history of the disease, and the precise seat of it, during its early stages.

Inflammation of the small intestines, originating in the mucous coat, generally commences with a morbid condition of the alvine evacuations. The bowels are seldom obstinately constipated, but they are sometimes costive. They are more frequently, however, more lax than natural; and often considerable diarrhœa is present. The evacuations are generally morbid, and of various colours in different cases; and frequently changing their character in the same case. They are offensive, more or less dark-coloured, and watery, and attended with griping pains about the umbilical region, which at first are not increased upon pressure. The abdomen is generally tumid; and the urine high-coloured and passed in small quantity. In some cases the motions are pale, fluid, and frothy, resembling fermenting yeast; at other times they are green, slimy, or gelatinous; and as the disease advances, they usually are of a dark green, variegated with lighter shades of colour, or with brown or yellowish-brown streaks; and at last they become very dark and grumous. Sometimes they are bloody; but this appearance is most frequently met with when the mucous surface of the large bowel, or of the cæcum, also becomes inflamed.

As the inflammation of the small intestines, thus commencing in the mucous tissue, proceeds through to the adjoining coats of the bowel, the griping pains, which evidently, from the very morbid and irregular state of the motions, arose from the irritation of diseased secretions, are converted into a sensation of internal soreness, sometimes with a feeling of heat. Firm pressure, which was borne heretofore without much increase of pain, now occasions a marked aggravation of it. The motions become scanty, and are attended with increased pain of a griping character. The tongue is white and excited, red at the point and sides, and foul and coated, especially in the middle and towards its base. There is usually much prostration of strength, especially of the lower limbs; the pulse is soft, quick, and frequently small; nausea and sickness supervene, with increased sensibility, heat in the abdomen, and much thirst.

As the disease advances through the substance of the intestine, the abdomen becomes more tumid and painful; tenesmus frequently supervenes, and the stools are watery, mucous, and often of a brick-red colour, and sometimes streaked with blood, more particularly if the inflammation extends to the large bowels. In the more chronic cases, the tongue becomes cleaner during the advanced stage of the disease, and assumes a dusky-red appearance, and is sometimes smooth and lobulated, particularly when the disease is complicated with morbid structure of the liver. In the advanced stage, the inflammatory action often involves all the coats of the intestine, proceeding from the mucous surface to the subjacent cellular texture as far as the peritoneal tunic, which is the last affected; and extends along the mucous surface to the large intestines on the one hand, and to the duodenum on the other, superinducing many of the symptoms of dysentery, with pain extending to the epigastrium and right hypochondrium, and great irritability of stomach.

Inflammation of the bowels, as now described, may be viewed as commencing in the small intestines generally, without reference to the particular part of them which first becomes its seat. When the disease most unequivocally proceeds from the acrid state of the biliary secretions, I am disposed to believe that the duodenum, or at least the upper portions of the small intestines, are first affected, the disease being more or less limited to them, or extending itself to the stomach on the one side, or to the large intestines on the other, or to both, according to the particular states of predisposition possessed at the time by those viscera. The vomiting which frequently accompanies the commencement of intestinal inflammation, and which depends upon the irritation of morbid secretions and the quantity of bitter and disagreeable matter thrown up from the stomach in these cases, are confirmatory of the opinion expressed on this point. In the majority of these instances of disease, the original disorder is to be looked for in the liver; and remedial means ought therefore to be directed to it as well as to the consecutive disease.

It not unfrequently happens, when the inflammatory state is induced in the duodenum by the flow of an acrid biliary fluid into it, that the turgescence of the mucous tunic of the intestine, about the mouth of the common duct, as well as of the lower portion of the duct itself, tends so completely to narrow, or even altogether to obstruct the flow of bile, as to occasion accumulations of this secretion in the gall-bladder and hepatic ducts. When this is the

case, the morbid bile retained in the liver and gall-bladder heightens the inflammatory state of this organ, and even tends to promote the occurrence of the worst consequences of this condition, more especially abscess of the organ. Hence it is that but few cases of inflammation of the small intestines, terminating fatally, are met with in India, uncomplicated with appearances of disease of the liver, especially congestion and abscess, the one being related with the other, as respects cause and effect, in the manner now pointed out.

If inflammation of the small intestines commences in what has been usually called the phlegmonoid form, or seize at once upon the substance of the intestine, the symptoms, from the commencement, are much more acute. The patient complains of sharp pains around the umbilicus and lower part of the abdomen, with a quick, small, and contracted pulse; a foul, white, and excited tongue; and an irregular state of the bowels, which are generally not completely constipated, yet are very scantily acted upon, and often require frequent doses of cathartics to open them fully, until after depletions and other means of cure have been employed.

When the disease attacks the patient in this manner, its progress is very rapid. The countenance soon becomes anxious; the pain is increased upon slight pressure; the urine scanty and very high-coloured; the respiration suppressed, owing to the increased pain proceeding from full inspirations; the skin is hot and harsh, especially over the abdomen; the stomach irritable, and vomitings supervene; the tongue becomes more deeply coated with a yellow, brown, or very dark fur; the abdomen more tumid and more painful; and the calls to stool more unsatisfactory, and attended with little or no relief. If the disease still makes progress, all the symptoms increase in violence; the countenance becomes sharp and anxious; the patient keeps his legs drawn up close to the abdomen, and lies on his back; the pulse is small, quick, and weak; the hands and feet are cold and clammy, whilst the abdomen is hot; the patient feels a sense of internal heat, which is often very remarkable from the commencement of the disease; the impatience of pressure on the abdomen increases; and the affection of the stomach becomes more urgent.

As the inflammation affects the peritoneal covering, and extends along it, the symptoms assume a more acute character; the pain is then often violent; the pulse harder and more contracted; the skin hotter and drier; the urine more scanty and higher coloured; the soreness and tenderness of the abdomen upon the slightest pres-

sure more remarkable, and the tumefaction much greater. As the disease advances, the abdominal fulness increases greatly; the soreness and pain are more diffused over the abdomen, and extend to both hypochondria and to the hypogastric region; hiccup, or dyspnœa, from spasmodic action of the diaphragm, also occasionally supervenes.

When gangrene takes place, all the painful symptoms subside; fainting, great exhaustion, sinkings, cold sweats, hurried respiration, and a scarcely perceptible state of pulse supervene, with increase of the abdominal fulness, and diminution of pain on pressure. Hiccup is now present and becomes distressing, although it may not previously have made its appearance, with the *facies Hippocratica*, and a remarkably increased action of the nostrils.

An unfavourable termination of the disease may also take place in consequence of the extension of the inflammation to the peritoneal surfaces, including the omentum; the serous surface of the small and large intestines and the omentum being glued together by coagulable lymph thrown out during the inflammatory process. On many occasions the inflammation extends itself to the adjoining viscera, they also forming adhesions to the parts in their vicinity, and even to the abdominal parietes. Thus the patient sinks rapidly under the extent of disease and its acute character, before gangrene commences.

Inflammation of the small intestines, commencing in the mucous surface, generally assumes a more chronic character, and a milder form than enteritis attacking at once the substance of the intestine. When this form of the disease terminates unfavourably, the inflammation of the internal surface becomes more intense, is accompanied with an abundant muco-purulent discharge, with ulceration generally commencing in the follicular glands, and extending through the substance of the bowel to the peritoneal covering on the one hand, and along the mucous surface into the cæcum on the other, giving rise to the symptoms of dysentery, and to excoriation and ulceration of the internal coats. At last the inflammatory action, in its progress, extends to the peritoneum; and the patient sinks from the extent of disease, as in the phlegmonoid form of enteritis, in some cases with evident sphacelation of the internal or villous coat of either the small or large intestines, and occasionally of both. The favourable termination of enteritis is generally indicated by the diminished severity of the painful and urgent symptoms from the treatment adopted; by the decrease of general fever; the obtaining of copious and free alvine evacuations; a more copious flow of

urine, of a paler colour; by the tongue becoming more clean and moist; and a diminution of abdominal tenderness, soreness, and tumefaction.

The intertropical practitioner must expect to observe enteritis, in one of the two forms into which I have divided the disease, supervene to functional or organic affections of the liver, especially those accompanied with a morbid secretion of bile. He will also have occasion to remark the supervention of hepatitis to the enteritic malady; and, on many occasions, he will observe the extension of inflammatory action from the large to the small intestines. Not only will disease of the one viscus thus supervene upon the malady of the other, but both will often present themselves complicated in such a manner as to render it a point of great difficulty to determine which was the original disorder, and what share the one had in the production of the other. Thus, hepatitis is often co-existent with enteritis, and enteritis with inflammatory dysentery,—inflammation in this latter complication having extended to both the small and large intestines. Occasionally, gastritis and enteritis also co-exist, but more frequently the latter supervenes to the former. With respect to the complication of hepatitis, enteritis, and dysentery, it is often impossible to determine which was primary: hepatitis seems most frequently to originate the other two maladies, when it is complicated with them; but yet it cannot be admitted that such is uniformly the case, as not unfrequently will hepatitis supervene to both enteritis and dysentery, although it evidently did not exist at their commencement.

With respect to the appearances exhibited, upon examination after death, of those who die of inflammation of the bowels, it is necessary to offer some remarks. Inflammation of the small intestines is met with in pathological research, either as the chief diseased appearance, or as subordinate to some other organic change. When it occurs as the former, it may be viewed as the idiopathic or primary disease, although this is not always the case; when in the latter condition, it may be considered as the consequence of the more important and more complete organic changes with which it is complicated. In each of these relations I shall now consider inflammation of the small intestines; premising that, when it takes place primarily, and terminates fatally, the most severe consequences of disease are observed; and that, when it supervenes to other diseases, death resulting chiefly from them, it presents every grade of severity, from the slightest inflammatory blush to the deepest ulceration, or even sphacelation. It is most frequently

observed, as already stated, consecutively upon disease of the liver and inflammation of the large bowels. When present in connexion with disease of the liver, it may be considered as the consequence of the morbid secretions of this viscus; when occurring in the course of dysentery or inflammation of the colon, it may have proceeded either from the morbid state of the bile, particularly if the liver betray any marks of disease, or from the extension of the inflammatory action from the mucous surface of the cæcum to that of the ileum. In some cases also, inflammation commencing in the mucous surface of the stomach will extend to the duodenum; and if the secretions poured into this latter viscus be of an irritating or acrid nature at the time, the already existing inflammatory action will be considerably aggravated thereby, particularly in this situation, and may be extended to the greater part of the intestinal canal.

When enteritis supervenes to inflammation of the stomach, liver, or large bowels,—the disease of these organs occasioning death, and thus furnishing an opportunity of examining the appearances which inflammation of the small intestines exhibits in its early stages,—the mucous coat of the canal is then generally more vascular and florid than natural; it is also more turgescent, particularly the valvulæ conniventes; and in many places the mucous glands are considerably developed, and marked by a deeper tinge of colour. These appearances are generally not uniform throughout the canal, but are most remarkable in the duodenum, jejunum, and upper portion of the ileum, when the inflammatory condition has been induced by a morbid state of the biliary secretions, or has been consecutive upon marked disease of the stomach; and they frequently are present in considerable patches, or broad streaks, leaving intermediate spaces of a nearly healthy state. The lower portion of the ileum, however, is oftenest found diseased in its mucous surface upon *post mortem* examination, and ulceration is most frequently seated in this part of the small intestines, owing, probably, to the greater accumulation of fæcal and morbid matters in this part of the tube, particularly when any obstacle to the passage of the intestinal contents along the colon is present: and when the inflammatory condition has been the consequence of great disease of the large bowels, the ileum, particularly its lower portion, usually presents the most marked appearances of disease.

At the same time that the mucous coat is thus rendered more vascular and turgid than natural, it generally also becomes softer; and if the inflammatory state has reached its utmost, this tunic assumes a brick-red tinge, is apparently thickened, and very easily

detached from the subjacent coat, the cellular tissue connecting it being soft, turgid, and inflamed. When this state exists through a considerable portion of the canal, the coats of the intestines are apparently thickened, arising from the inflammation having extended from the internal surface through the cellular substance connecting the tunics of the intestines, till the attached surface of the peritoneal covering is even approached in some parts. When this is the case, the substance of the small bowels may be considered as being affected, even although the external surface of the part may present no further marks of inflammation than red vessels ramified through it. Occasionally, however, in addition to the state of the parts already described, the red capillaries, scattered in the inflamed peritoneal surface of the intestine, are evidently connected with the effusion of coagulable lymph, particularly in those situations where they are most numerous and manifest, the lymph being effused in specks or considerable spots, upon the serous surface. When these appearances are remarked upon the exterior surface of the inflamed intestine, the interior frequently presents more serious changes than yet described. The mucous surface has a deeply-inflamed and excoriated appearance, with smaller portions of a dark or sphacelated hue, and with ulcerated specks, or even large ulcers, which have nearly penetrated as far as the external covering of the intestine. In some cases, one or more of these ulcers have actually made their way through the peritoneum also, and the contents of the bowel have thus been partly discharged into the cavity of the abdomen. In some cases, the ulcer has been attached at its margin to an opposite convolution of the intestines, and thus been prevented from allowing the escape of the fæcal matters into the peritoneal sac. In others, the peritoneal surface has been covered with coagulable lymph in the progress of the ulcerations through this membrane, and the ulcers plugged up, or rather covered over, by the lymph effused.

When the small intestines are ulcerated from consecutive disease, the places adjoining the ulcers present various states of organic change. In some cases, they are thickened, softened, and injected; in others, they are pale ash-coloured, even thinner than usual, and presenting no inflammatory appearances, excepting in the margin of the ulcerated part. When the ulcers are large they are generally few in number, and with considerable spaces or even portions of intestine intervening between them. Sometimes they are as small as mustard-seed, numerous, and collected in one particular part, leaving large spaces or even portions of the intestines in a healthy

or at least slightly inflamed state. When the ulcers are thus small and conglomerated, they are generally surrounded by an elevated base, and are evidently seated in the mucous follicles and vicinity, constituting a distinct variety of ulceration from the large, distinct, and rare ulcers previously described.

Ulceration seated in the mucous follicles has generally an elevated margin and base, and a deep indentation in the centre, of a darker colour than the surrounding margin. In addition to this state of the follicles, the inflamed mucous surface also presents excoriated portions, with patches entirely devoid of a mucous coat; and in the most acute cases the mucous membrane is sphacelated in large patches.

In the forms of enteritis in which the inflammation commences in the substance of the intestine, or in its peritoneal coat, or in which it extends itself speedily to these parts, the whole of the coats of the bowel are very vascular, red, or of a brick-red colour, and readily lacerated. Coagulable lymph is generally effused upon the peritoneal surface, either in distinct clots, or as a general film, of greater or less thickness, and gluing the intestinal convolutions to each other, and to the adjoining viscera and surfaces. In these cases the omentum generally has participated in the inflammatory action, and is either found more than naturally vascular, united to the bowels underneath, or occasionally drawn up irregularly to the arch and flexures of the colon.

If the *post mortem* examination be performed within a very few hours from death, the vascularity of the inflamed parts will be very great; and although the colour of the most remarkably diseased parts may be beginning to change, indicating the commencement of the gangrenous process, yet complete gangrene of the substance of the intestine is not so frequently met with as is generally supposed at so early a period of examination. It is, however, very common to find the mucous surface apparently sphacelated in places adjoining to the ulcerated portions of the intestines, and the external coat of the same part presenting merely a bluish tint, but not altogether deprived of its cohesion, although it is more easily lacerated than in the healthy state.

When inflammation of the small intestines, whether commencing in their mucous surface, in their substance, or in their peritoneal covering, is neglected or badly treated, it not unfrequently gives rise to a state of chronic disease, in some one or more of the coats of the intestine, when it does not terminate in organic change of some other kind, more speedily tending to the destruction of life,

such as already described. A very large proportion of men who return from India disabled and invalided, suffer under the consequence of this neglect. In many of them, in addition to chronic affections of the liver and symptoms of chronic dysentery, and even independently of these, there is a peculiar tightness and dryness of the skin covering the abdomen, giving the surface a parchment-like appearance, the abdominal contents being apparently drawn back upon the spine, and the belly presenting a singularly empty or hollow form. Upon minute examination, during the life of the patient, the abdominal parietes seem as if formed of a single layer, the skin being firmly attached to the abdominal muscles underneath; and the small intestines may be often distinctly felt in the umbilical region, in a hard or pulpy state.

Upon examination after death, the parietes of the abdomen are particularly thin; the integuments on the one side, and the peritoneum on the other, being firmly and intimately attached to the abdominal muscles, which are much wasted, little or no cellular substance seeming to intervene between these textures. The omentum generally presents a leucophlegmatic appearance, being diaphanous, and its cells loaded with a watery fluid, and, in many places, with a hard, fatty-like matter. The peritoneum is generally pale, and sometimes free from adhesions; at other times adhering in various places. The small intestines are generally of a pale colour, much contracted, and lined with a copious exudation of a thick, cream-coloured, viscid matter, which frequently seems to fill their calibre, to glue their internal surface, and to obstruct their canal. The large intestines are distended with flatus, their coats nearly transparent and empty. The mesentery generally presents a watery or leucophlegmatic appearance.

SECT. II.—*On the Treatment of Inflammation of the Small Intestines.*

Enteritis requires the most energetic and prompt treatment within the resources of the medical art, more especially when the inflammation attacks the substance of the intestine, or its peritoneal coat. When inflammatory action supervenes in the mucous tissue although the symptoms are milder and the disease less active, yet the treatment should likewise be decisive; for we know not how soon inflammation may extend itself, if it be not already proceeding through the substance of the bowel on the one hand, and along its canal on the other. In some habits and constitutions, the exten-

sion of inflammatory action is uncommonly rapid; and if it be not arrested at its commencement, the most decided and appropriate means will subsequently fail. A tendency to spontaneous resolution of inflammatory action ought never to be looked for in the European constitution, in an intertropical climate, and therefore should not be expected to assist in their removal. Functional disorders occasionally operate their own cure, by the increased discharges characterising their progress, or supervening in their advanced stages. But when inflammation is once established in an organ or structure of the body of an European residing in a hot country, unless controlled by very prompt and bold measures, it soon terminates in gangrene, in abscess, in effusion, or in a state of chronic inflammatory action, according to the nature of the part affected, and the habit and temperament of the patient.

When inflammation commences in the mucous surface of the bowels, we should never be induced, by the apparent mildness of the disease, to omit having recourse to very active local depletions. It should always be recollected that, however mild may be the character of the disease, the mucous surface of the bowel, in some part of its extent, may be very actively inflamed; the follicular glands underneath it may also be very seriously diseased, and the disorder may run rapidly into ulceration, without any more acute symptoms making their appearance. Therefore, if the patient complain at all of soreness, heat, or griping pain in the bowels; if the pulse be in any measure affected; if the motions be frequent, scanty, watery, mucous, and morbid in appearance; the tongue excited, white, or loaded; and still more especially if there be abdominal fulness, tension, soreness, sense of heat, which are increased upon a very firm pressure,—a large number of leeches should be immediately placed upon the abdomen. If the patient be at all plethoric, or have been previously in a tolerable state of health, from thirty to forty ounces of blood ought to be abstracted in this manner. When the leeches have entirely ceased to bleed, hot poultices should be applied over the abdomen, and frequently renewed; and twenty grains of calomel, with two grains, or even three, of opium, given immediately, if the leeches have been applied early in the day; but if they have been prescribed in the afternoon or evening, then the exhibition of the calomel and opium may be deferred till the time of repose.

If the more urgent symptoms are not altogether removed at the end of ten or twelve hours from the application of the leeches, the repetition of them will be requisite, but the number which should

be applied will necessarily depend upon circumstances connected with particular cases. If the symptoms are acute, and the abdomen full and tender, then the decided local depletions already mentioned may be ventured upon, especially if the strength of the patient be not much reduced. Hot poultices ought again to be applied, and the calomel and opium given as before.

The great advantages of hot poulticing are, that it tends more than any other remedy, particularly when the poultices are large and frequently renewed, and still more so if the calomel and opium have been given,—to determine the circulation to the surface of the body, to equalise its distribution, and to bring out a copious perspiration.

The practice of prescribing calomel and opium after vascular depletions, has been long adopted in India, and it has been employed with the most beneficial effects, in all cases of inflammatory affections of any of the abdominal viscera. When given after a decided blood-letting, whether general or local, it frequently keeps down the vascular action nearly to the standard at which it was reduced by the blood-letting. It has also the great advantage of allaying the irritability of the stomach, when this symptom is present, more completely than other remedies; of tranquillising the nervous system, and disposing to sound repose—measures most beneficial in preventing the return of inflammatory action after large depletions; and of changing the morbid character of the secretions, on which the disease so often depends, and fitting them for removal by means of the subsequent administration of purgatives. The advantages of purges and aperients, particularly those which are of a mild and cooling quality, in this particular form of enteritis, are evident: they carry off the morbid secretions, and prevent the supervention of ulceration and the progress of the inflammatory action,—consequences frequently resulting from the retention of morbid matters in the primæ viæ, in warm climates. Similar advantages to those arising from the use of aperients and purgatives also proceed from administering aperient and emollient enemata. Medicines exhibited in this latter way prevent accumulations from forming in the cells of the colon, and dissolve and remove them if they be already formed.

In the phlegmonoid form of enteritis, when the inflammation seizes primarily upon the substance of the intestines, or when it commences in, or extends to, the peritoneal coat of the bowel, the vascular depletion should be immediate and most copious. If the patient be plethoric, young, and not reduced by previous disease,

blood-letting from the arm to a considerable extent, followed by local depletion, is indispensably requisite. In these cases, the repeated application of hot poultices over the abdomen, and the exhibition of calomel and opium, as already recommended, should be always resorted to, and be followed by purgatives and cathartic enemata, to carry off offending matters.

During the intervals between the exhibition of those remedies, saline medicines may be prescribed, with a view of promoting perspiration and equalising the circulation: and in order still further to promote this effect, the hot poulticing already noticed may be persevered in for a long time after the local depletion, or a warm bath may be ordered.

If the biliary secretions are of a morbid quality, the calomel and opium, in the full doses recommended, may be repeated until they assume a healthy character, or the mouth becomes affected; for, until a tolerably natural state of the secretions be procured, we cannot expect permanent recovery from the disease.

With regard to the employment of blisters in the inflammatory affections of the bowels, much discretion is required on the part of the practitioner. If they be applied before inflammation is subdued, they either fail of being serviceable, or they tend to aggravate the disease, unless they are so large as to occasion a complete revulsion of the capillary action to the blistered surface,—an effect which they can seldom produce, unless the inflammatory action is slight in degree or small in extent, or has been nearly altogether removed by the previous treatment. When the disease is subdued, or nearly so, the external inflammation produced by blisters frequently seems to prevent the return of the internal disorder: at this period, therefore, of the malady, they should seldom be omitted.

During convalescence from inflammatory affections of the small intestines, the diet of the patient ought to receive great attention. As soon as an appetite returns, it must be indulged in with great caution; and mild broths, and farinaceous articles of diet only, such as arrow-root, sago, &c., be given for some time. The patient ought to wear flannel next his skin, and be very careful not to expose himself to vicissitudes of temperature or to moisture.

The regular action of the bowels is a matter of the greatest consequence in convalescence from this disease, and should be promoted by mild and cooling aperients and laxatives, such as the soluble tartar, manna, the bitter aperient mixture, &c. At the same time the secretions, particularly the biliary secretion, require attention, and should be corrected whenever they betray any morbid

tendency. For this purpose, the patient should take occasionally five or ten grains of blue-pill at bed-time, and have the abdomen sponged with the nitro-muriatic acid lotion, as previously recommended.

In the chronic cases of inflammation of the small intestines, supervening to neglect, or to a treatment which has been insufficiently active, where the state of the intestines, and other appearances, such as described at the conclusion of the foregoing section, are observed, large doses of calomel, given at bed-time, followed by warm aromatic purgatives, and poulticing over the whole abdomen with the nitro-muriatic lotion, have been found most serviceable. Large doses of calomel seem to act in a most appropriate and beneficial manner upon the thick, tenacious matter which seems to obstruct the calibre of the intestines in these cases, dissolving and detaching it from the mucous surface to which it so closely adheres, and thus preparing it for the operation of the purgative which is to follow. It is the combination of the calomel with this morbid secretion, and the admixture of bile with both, which gives the stools the dark or greenish-black, or even the greyish-brown appearance, which they often present in these and similar cases.

CHAPTER III.

ON THE FUNCTIONAL DISORDERS OF THE LARGE BOWELS.

THE functional disorders of the large bowels are chiefly characterised by a deficient tone or action—by a torpid state of the functions usually performed by the different tissues composing these viscera: and although these disorders often are but little calculated to excite either the attention of the patient or the fears of the practitioner in their early stages, yet they not unfrequently lead to serious consequences, and excite dangerous diseases either of the structures in which they are seated, or of more remote organs.

In the present chapter, I shall first direct the attention of the reader to the morbid accumulations in the large bowels, and afterwards offer a few observations on some of the most important consequences which are induced, either in an immediate or in a remote manner, by this state of functional disorder.

SECT. I.—*On Accumulations of Morbid Secretions and Fæcal Matters in the Large Bowels.*

Owing to the form and connexions of the cæcum and colon, the matters discharged into them from the small intestines, as well as the secretions poured out from their own internal surface, are liable to be retained for a very considerable time. Even in health, a remora of these matters takes place; indeed the conformation and relative position of the cæcum and colon are such as are evidently intended to retain for a short time the various matters discharged into them, in order that the last act of the process of digestion shall be completed, and until their fæcal contents accumulate in sufficient quantity for removal. When, however, the fæcal matters are retained longer than is requisite for this purpose, morbid accumulations and obstructions supervene, occasioning mischief not only to these viscera themselves, but also to all the organs with which they have any relation.

Amongst the more immediate consequences of an inactive or torpid state of the functions of the cæcum and colon, is the retention

of the mucous secretions poured out from their follicular glands, and the impediment which the consequent accumulation causes to the functions performed in the mucous tissue of these bowels, and in the follicles themselves. The viscid and tenacious mucous which is thus collected obstructs the free discharge of the secretion from the follicular glands eliminating it, and gives rise to accumulations in them, as well as in the ducts leading from them. Hence the mucous follicles frequently become obstructed, distended, and subsequently inflamed and ulcerated.

When, in addition to this accumulation of viscid secretions on the internal coat of the large bowels, the fæcal matters are also retained, a still more energetic cause of mischief is superadded, and disorder becomes more general and severe. The more fluid portions of the fæces, and of the secretions themselves, are then absorbed into the circulation, and the consequences of this absorption of matters which are excrementitious and hurtful to the system may be readily inferred.

When the biliary secretion is retained for a longer time than usual in the *primæ viæ*, owing to the functional torpor of the large bowels, a great proportion of this fluid is absorbed and carried into the circulation, inducing the more frequent and slighter forms of jaundice. This appearance, however, is not to be viewed in the light of an idiopathic disorder, but merely as a symptom of disease, either existing in the biliary apparatus, or in the primæ viæ. When the large bowels are loaded with accumulated secretions and fæcal matters, a jaundiced state of the countenance and skin is a very natural consequence, particularly among those in whom the biliary secretion is generally in excess: for the absorption of the more fluid parts of the bile will go on, in the small intestines especially, with a rapidity, great in proportion to the deficient secretion from the large bowels. In those cases the stools will seldom betray a great deficiency of bile, although they may betray it on some occasions; but this appearance is extremely fallacious, as a small quantity of the cystic bile will serve to colour a great many alvine evacuations.

But it is not only the mischievous effects arising from the absorption of excrementitious matters which are to be considered as the legitimate consequences of accumulations formed in the cæcum and colon, but the influences proceeding from these accumulations, in a more direct, and frequently mechanical manner. When accumulations, either of mucous secretions, or of the fæcal and other materials, or of all these combined, form in the cæcum and large

intestines, the mucous follicles become obstructed, enlarged, and disposed to disease of a serious nature; the mucous tunic is impeded in the performance of its various functions; the muscular coats of the bowels become flaccid, and their irritability diminished; the accumulated materials enter into new combinations, give rise to gaseous productions, and at last degenerate into noxious matters; and thus the cæcum and cells of the colon are enormously distended by these materials, many of which have been collecting from a remote period, and by the flatus evolved from their decay and the new states of combination they are disposed to assume, from the presence of moisture, combined with a high temperature.

The distension which frequently takes place in the colon and cæcum from these causes is often very great, and of itself productive of serious disorder. When in this unnatural state, the cæcum and sigmoid flexure of the colon press upon the femoral nerves and blood-vessels, the vena cava, and internal iliac veins, producing numbness, cramps, pains in the lower extremities, and even œdema, owing to the impeded return of blood through the veins. The ascending and descending portions of the loaded and distended colon press injuriously upon the kidneys and adjoining vessels, and occasion a dull aching and a sense of weight in the loins, with disorder of the urinary secretion. When distension of the right flexure and transverse arch of the colon is present, the functions of the liver, the discharge of bile into the duodenum, and the states of the gall-bladder, the duodenum, and stomach, are very materially interfered with. If the accumulations in the arch and flexures of the colon be carried to their utmost, the healthy conditions of the stomach, duodenum, liver, gall-bladder, and biliary ducts, become very seriously deranged, the descent of the diaphragm is much impeded, and the disorder extended to the functions of the lungs and heart. Owing to this latter effect, together with the mechanical influence of the original cause upon the abdominal circulation, the return of blood from the head is retarded; and, as one of its most remote consequences, congestions on the brain, and effusions of serum from its membranes, supervene.

When accumulations thus form in the large bowels, the small intestines also experience, in some degree, a similar state of disorder, and the functions of the stomach and liver are also deranged. The patient generally complains of deficient appetite and impeded digestion, with all the symptoms of dyspepsia, and the process of

chylifaction and nutrition are imperfectly performed. This latter consequence is one to which the course of morbid phenomena necessarily leads; for the morbid secretions and sordes collected upon the mucous surface of the digestive canal obstruct the discharge of the intestinal juices, and consequently the alimentary matters passing through the bowels in the form of chyme undergo a less perfect change, and are insufficiently animalised. The same accumulation which is thus placed in the way of the exhalent vessels and follicular ducts, is also equally an obstruction to the absorption of the chyle which is formed; and, owing to the quantity of excrementitious matter with which the absorbing surface is loaded, the chyle which is formed and absorbed is either imperfectly concocted, or mixed with some of the more fluid excrementitious materials retained in the bowels, and which, during a more active state of the intestinal functions, would have been carried out of the system. In either case, an unhealthy, or at least an imperfectly prepared, fluid is absorbed; and, whether it passes through the mesenteric glands before it is carried into the general current of the circulation, or is directly conveyed into the blood about to circulate in the portal vein, is calculated to induce a morbid condition of these parts.

Enlargements, and other diseases of the mesenteric glands often originate in this manner; and it appears, that when such derangements admit of removal or amelioration, these ends can only be accomplished by remedies which act first in carrying off the morbid accumulations which have formed, and afterwards in improving the secretions and the quality of the chyle formed during the digestive processes.

When an unhealthy chyle is formed, and excrementitious matters carried into the circulation, in the manner now pointed out, the process of nutrition is imperfectly performed; the countenance becomes pale, and afterwards sallow; the body wastes; various symptoms of disorder, some referrible to the digestive canal, others to the biliary organs, many to the organs of respiration and circulation, and some to the nervous system, supervene, according to the peculiar constitution and predisposition of the patient, leading the practitioner to dread the existence of organic disease of some one of those organs, but generally disappearing before a well-regulated course of purgative and aperient remedies, or as soon as a copious discharge of the morbid accumulations is procured, and the bowels assume their healthy functions.

But it is not only in causing the absorption of an impure chyle,

and of a portion of the recrementitious matters contained in the alimentary canal, that accumulations in the prima via, more particularly in the cæcum and colon, occasion disease; but the sordes and secretions which collect upon the mucous surface and in the cells of the colon, undergoing changes from the temperature in which they are placed, become sources of irritation to the follicular ducts and to the surfaces with which they are in contact. In many instances, the irritation thus occasioned is followed by an increased exhalation from the capillary vessels of the internal membrane, and an augmented discharge of mucus from the follicular glands, which tend to detach the accumulated materials that are the original cause of disorder from the surfaces which they load,—a spontaneous diarrhœa thus supervening, and relieving the patient. In other cases, the irritation produced by the morbid accumulations is not only followed by an increased exhalation and secretion, but also runs into an inflammatory state of the capillaries supplying the mucous surface, frequently terminating in ulceration, and extending to the subjacent coats of the bowel.

Many of the worst cases of dysentery and chronic diarrhœa which are met with in India originate in this manner; the morbid matters collected in the cæcum and in the cells of the colon inducing an irritative state of inflammatory action of the mucous surface of these parts, with spasmodic constrictions of the muscular tunics, speedily terminating in excoriation and ulceration, if active remedial means be not employed early in the disease.

In many cases, the accumulated secretions and sordes lining the mucous surface of the intestines, especially the large bowels, are the nidus for the generation of intestinal worms; these parasitic animals becoming an additional cause of disorder, and often giving rise to morbid phenomena still more remote from the seat of disease than those most frequently resulting from the original cause of disorder, namely, the accumulations in the bowels themselves. This consequence of allowing the secretions of the bowels to collect upon their internal surface, particularly in the situations already specified, is one of the most frequent which occurs in all climates, particularly in warm or intertropical regions. Amongst the natives of warm countries, the irritation of worms in the *prima via* is a most frequent cause of disease, particularly in conjunction with the morbid accumulations and sordes in and from which they breed.

Many of the diseases, also, which affect the skin, particularly

those of a chronic nature, depend upon accumulations in the large intestines, and the absorption of excrementitious materials from the *prima via*, which, in the course of their discharge upon the external surface of the body, irritate and inflame the vessels ramified in the delicate tissue subjacent to the cuticle. That this should be a frequent cause of cutaneous eruptions in intertropical regions cannot be a matter of surprise, especially when we consider the quantity of fluid loaded with excrementitious matters which is constantly discharged from the surface of the body in warm climates. Whatever view may be adopted respecting the origin of these disorders, there can be no doubt,—for it is a subject of general and repeated observation,—that the most successful mode of removing them, and of preventing their return, is by instituting a regular course of laxatives, and by restoring the bowels, more especially the colon, to a healthy state of function.

Amongst other derangements occasioned by an overloaded state of the large bowels, either in a remote or immediate manner, hypochondriacal and melancholic affections require a very particular notice. As these are of great consequence, both in a pathological and therapeutical point of view, I shall return to this subject, in order to bestow upon it due consideration.

Accumulations of fæcal matter and morbid secretions in the large intestines, besides occasioning diseases seated in remote parts which either sympathise with the *prima via*, or are associated with it in function, and besides irritating and inflaming the surface upon which they accumulate, actually occasion elongations and displacements of the large bowel itself, which necessarily tend to increase and to perpetuate the disorder occasioning them. This is a pathological condition of great importance, especially as respects its consequences; on that account, therefore, I shall consider it in a specific manner in the sequel; and I shall also devote particular attention to some other derangements of function which seem most frequently—in warm climates at least—to depend upon accumulations of fæcal materials and morbid secretions in the bowels, or to originate in this kind of disorder, although afterwards assuming an independent and specific form of existence.

In respect of the symptoms indicating a loaded state of the cæcum and colon, it is necessary that the practitioner should be well informed. The experienced observer of disease needs not to be told that these symptoms are very various in different cases, and that the disorder of organs remote from the seat of disease will often be the chief cause which we may have of suspecting the

nature of the orginal derangement. In all cases, an accurate examination should be made of the abdomen of the patient, commencing with the seat of the cæcum in the right iliac region, following the direction of the colon between the top of the ilium and right ribs, across the epigastric region, and under both hypochondria to the left side and left iliac fossa. If, in the course of our examination, pain be complained of, chronic inflammation should be suspected, and its existence judged of according to the symptoms present. If there be fulness evidently existing in the course now pointed out, or in the abdomen generally, and particularly if the fulness give a doughy sensation to the hand of the examiner, we may consider that the internal surface of the bowels is lined with sordes and accumulated secretions. If more or less hardness be perceived about the seat of the cæcum, or in any part of the course of the colon or its sigmoid flexure, then the accumulation of hardened fæces should be dreaded. But even in cases where the most careful examination furnishes no proofs of the existence of morbid matters in the prima via, we are not on that account to infer that they do not actually exist. Flatulence, either of the small or large intestines, frequently prevents the examination from being so successful as it would otherwise be; and even although the internal surface of the bowels may be much loaded, yet their calibre may also be so much contracted, or at least so little distended, as to give rise to little or no sensible fulness of the abdominal regions. Besides, it often requires very considerable tact to discover this species of derangement by manual examination—a tact which can be acquired only by experience.

Although, therefore, a very careful examination of these regions should be resorted to on all occasions, and although much important information is generally obtained from it, yet the absence of fulness and hardness, or even a natural state of the abdomen, ought not to convince us that morbid accumulations in the bowels do not exist. In order, therefore, to satisfy ourselves upon this point, we must inquire after other symptoms, and direct our observation to the phenomena now about to be described, though a few of them only are present in individual cases; some of them characterising one case, and others another, according to the particular habits, constitutions, and temperaments of the patients.

When the large bowels are loaded in warm climates, the tongue is generally furred, particularly in the middle and at its root. The patient complains of a disagreeable bitter taste of the mouth, with clamminess of the tongue and fauces, and fœtor of the breath. The

countenance is sallow or pale, and covered with an oily moisture. The skin is dusky, and generally in a moist, clammy state, readily perspiring upon the least exertion, and frequently exhaling a disagreeable fetid perspiration. The appetite, early in this state of functional torpidity of the large intestines, is but little impaired; but the digestion is generally weak and difficult, the stools scanty, hard, or at least formed, and of a dark colour; they afterwards, in some cases, are voided more frequently, but they are still scanty, and sometimes attended with slight tenesmus, and are occasionally scybalous, or consisting of pellets of hardened fæces. The urine is generally high-coloured, and deposits a very copious sediment. The pulse is seldom much affected; it is more frequently languid than the reverse, until the morbid accumulations have given rise either to some degree of irritation of the mucous surface, or to slight constitutional disturbance. Headach, and various nervous symptoms, are also frequently complained of at an early stage.

When the accumulation of fæcal matters and morbid secretions in the colon have been long forming, and are present to a considerable extent, they generally occasion, in addition to the foregoing symptoms, uneasiness, pain, sense of weight, and distension of the abdomen. There are frequently, also, loss of appetite, inactivity, dull pain of the loins, resembling lumbago, weakness of the lower extremities, with an aching sensation or shooting pains, a furred state of the tongue, particularly in the morning: sometimes a heavy pain, with tension of the abdomen, is complained of, with drowsiness, pain or weight in the head, and sleepiness or disturbed rest. If the accumulations are allowed to remain without sufficient evacuations, or scanty and unfrequent motions only, then diarrhœa, or even dysentery, frequently supervenes. The morbid and putrid states of the retained secretions and fæcal matters irritate the mucous surface on which they are retained, and often speedily induce a state of ulceration, with all the symptoms of the worst forms of dysentery.

Although the patient may have daily evacuations from his bowels, accumulations of morbid matters in the large bowels may actually exist to a considerable extent. The practitioner should be on his guard respecting this circumstance, as many are misled by it, and conceive that the apparently healthy state of the stools, and the frequency of their being voided, are sufficient proofs that the bowels are fully unloaded. This, however, is only one proof that such is the case, and often a very fallacious one. The cells and flexures of the colon and the cæcum may contain morbid matters,

even of considerable bulk, without impeding the passage of other substances. This is often demonstrated during the treatment of various diseases, and even by *post mortem* examinations.

In numerous cases wherein disorder was consequent upon morbid accumulations in the large bowels, I have remarked that the patients scarcely ever complained of the torpid state of the alvine functions. Indeed, they have often complained of a more than usual frequency of the calls to stool. This is generally misunderstood, both by the patient and practitioner, for a copious discharge from the bowels; but such is seldom the case: the calls, although sometimes frequent, are followed by a very ineffectual relief, and the more recently formed fæcal matters only escape, whilst older accumulations still remain, producing disorder both of the alvine functions and of the whole economy of the system.

Upon inspecting the stools in these cases, they are generally more or less fluid, or are of a soft consistence, and apparently composed of hardened fæces, broken down amid a dark-coloured fluid. Sometimes they are nearly of a natural colour, but often brown, greenish-brown, or muddy; they are generally offensive. If in this state a gentle aperient be given, the stools are frequently to appearance not much disordered,—a circumstance which often misleads both the physician and the patient, and the disorder is therefore imputed to some other cause. If, instead of a gentle purgative, an active cathartic remedy be exhibited, the patient has frequent irritating calls to stool; the motions are watery, and loaded with a gelatinous mucus; and he often complains of tenesmus,—consequences which, equally with the former, tend to mislead. In these cases, the cause of disorder is frequently overlooked, and the employment of suitable medicines either not persisted in sufficiently long to be productive of advantage, or not at all resorted to.

In cases of this description much discrimination is requisite in the choice of purgative to be prescribed. If aperients and laxatives only be employed, they are seldom sufficiently powerful to remove the accumulated matters, and frequently they do little more than procure the discharge of the more watery parts of the fæcal contents, or the excrementitious materials more recently formed. If active cathartics be prescribed, they often occasion distress, by irritating the mucous surface so far as to excite considerable action of the muscular tunics of the bowels, and to occasion a firmer retention of the accumulated matters in the cells of the colon, so that the more fluid portions of the fæces only are brought away, with the

exhaled fluids and the mucous secretion which the irritating effects of the cathartic had very greatly increased.

Even when the most appropriate kinds of purgatives are employed in the removal of morbd accumulations in the large bowels, their operation frequently fails of producing the desired effect until after they have been continued for a considerable time. Often, for several days, the stools betray no morbid appearance beyond being more than usually offensive and somewhat morbid in respect of colour; but a steady employment of them for some time is usually followed by decidedly beneficial effects. The stools become sooner or later more and more copious, and require smaller doses of the medicine to act upon them. As they become more abundant, so their morbid appearances are more decided: they are now frequently almost black, or of a greenish black, or a very dark green, or dark brown colour, extremely offensive, and sometimes containing large lumps of a hard consistence, which, when broken down, are perfectly dry in the centre: sometimes these lumps present a putty-like consistence, and vary in colour from that of this substance to a dark green, a dark brown, or even a nearly black hue. In some cases the motions change from a pale clay-colour and putty-like consistence to a curdly green appearance, mixed with a large quantity of a gelatinous, viscid, and tenacious mucus; and occasionally the latter appearance changes to the former: but most frequently these conditions of the stools are observed in distinct cases, the latter being very generally associated with, and indeed arising from, in numerous instances, the collection of hardened fæces in the cells of the colon.

Having thus drawn attention to the characteristic phenomena of accumulated fæces and secretions in the cæcum and colon, I proceed to notice some of the causes on which this disorder seems to depend: and, *first*, it will be requisite to premise a few particulars with respect to the pathological condition of these bowels which lead to such accumulations.

Accumulations, whether of the excrementitious portions of the secretions poured into the digestive canal, or of alimentary matters received into the stomach, are generally the result of a torpid or inactive state of the viscera in which they are collected. This state of torpor is commonly connected with debility of the frame generally, or of the digestive organs and lower bowels more particularly, or with both these conditions. In whatever manner it is related, it is generally characterised by a deficient exhalation from

the internal surface of the large bowels, and by a scanty secretion of mucus, that which is secreted being more viscid and tenacious than in health, and often obstructing the follicular ducts. Connected with deficient or even morbid secretions from the mucous surface, the actions of the muscular tunics of the viscera are likewise impaired, allowing in places considerable dilatations of the calibre of the intestine, and accumulations to supervene, which their contractile energies are afterwards insufficient to remove. Even when no such dilatations exist, the torpid state of the muscular fibres of the bowel occasions a slow progression of the fæcal or excrementitious matters along the different flexures of the colon, and, in many instances and on frequent occasions, a complete remora of them, particularly in the cæcum and above the sigmoid flexure of the colon.

From this it will be inferred, that the causes of accumulations in the large bowels are whatever tends, directly or indirectly, to lower the energy of the digestive functions, or of the whole frame. Thus, sedentary occupations, want of pure air and sufficient exercise, indolence, full living (particularly when conjoined with the former causes), late hours, too great indulgence in sleep or in bed, and the use of two warm and too soft beds, tend very generally to produce a weak state of the digestive organs, and torpor of the large bowels.

A constipated state of the bowels is generally the first stage of morbid accumulations in the *prima via*; yet such accumulations may also occasionally supervene without the bowels becoming constipated so as to attract the notice of the patient. An inactive state of the alimentary canal is extremely common amongst females, particularly those of a nervous and melancholy temperament, and who lead an indolent mode of life. It is very frequently observed in a slight and less hurtful form in persons of a robust constitution and in high health, more especially during voyages by sea, or when travelling on long journeys in a carriage. In these cases, little or no inconvenience is felt from the confined state of the bowels for a time; yet, if they be long neglected, accumulations of morbid secretions and fæces form in the cæcum and cells of the colon, particularly about its sigmoid flexure, occasioning the consequences already pointed out, namely, either irritation of the mucous surface of these parts, followed by diarrhœa, or inflammatory action, with more or less severe local and constitutional symptoms.

Of all the causes which contribute to the production of the species of disorder now under consideration, there is none more frequently

observed, or more direct in its operation, than neglecting to attend to every call to stool which an individual may receive. When the fæces are thus pent up in the rectum and lower portion of the colon, from this neglect, accumulations must necessarily take place, and be carried to a morbid height, from the circumstance of those parts, the contractions of which gave rise to the inclination for stool, having subsided to a state of relaxation, after having been resisted in their natural actions, and in this way a mechanical displacement of some parts of the intestinal canal may easily be produced.

In cases where the functions of the stomach and liver are very deficient, and the bile not sufficiently stimulating to the alimentary canal, a torpid condition of the large bowels is a frequent consequence; but even in such instances, the inactivity of the bowels may be looked upon rather as resulting from the state of debility under which the whole digestive organs labour, than as being altogether the consequence of an imperfect secretion of bile, or of the absence of the properties which this secretion usually possesses in health. During the employment of purgatives in cases of this description, and the persisting in the use of them for a sufficient time, it is almost surprising to observe the quantity of viscid, tenacious mucus which is brought away along with fæcal matters which have evidently been long pent up in the cells of the colon. Sometimes stools have a gelatinous appearance and consistence, from the quantity of this kind of mucus with which they abound. At other times this substance forms only a part of the stool, the rest consisting of fæcal, offensive matters, and a watery fluid, with broken-down fæces: when such evacuations are observed, the mucus is often very ropy or glairy, particularly tenacious, and always deposited at the bottom of the vessel, owing apparently to its greater specific gravity. In such instances, a stick is required to ascertain its existence, when it may be raised along the sides of the vessel by the point of the stick, in one or more tenacious, glairy masses. As respects colour, these mucous evacuations vary very remarkably. Sometimes they are of a deep green, passing into a greenish black; at other times they are of a yellowish green, and of every shade to a bright orange and pale yellow.

When the evacuations present the above appearances, I have generally considered that the viscid and morbid secretions on the internal surface of the alimentary canal had occluded the mucous ducts, and occasioned an accumulation of mucus in them; and that the continued action of purgatives had succeeded in detaching from the mucous surface the viscid and tenacious sordes with which it was

loaded, and in setting free the mucus with which the follicles and follicular ducts were congested. Hence the necessity of continuing the operation of purgatives until this state of the stools disappear, and until the alvine evacuations assume a healthy character. In cases of this description, free purgation is indispensably necessary to the recovery of the patient, and must be persisted in; and ample doses of the purgatives prescribed are generally at first required to produce any effect. It seems as if the quantity of viscid mucus, lining the intestinal canal for a while, protected its sensible surface from the irritating influence of the medicine prescribed; but as this substance is removed by the operation of the purgatives, more especially by the calomel, so the bowels are more easily acted upon, and smaller doses of the remedies are found sufficiently active.

I have endeavoured to be thus explicit in the explanation of my views upon this point, which I conceive to be of great importance, both in a pathological and in a therapeutical point of view. In respect of the former, I consider that the accumulation of the secretion giving rise to the state of stools now described, is most influential in originating disease of the mucous surface of the whole alimentary canal, but more particularly of that part of it which lines the cæcum and colon, and in producing disordered function of various more or less remote organs. As to the latter, I have often had occasion to know, that the gelatinous and glairy state of the evacuations has been considered as the result of the irritation of the purgative remedies upon the mucous surface, instead of being viewed as indicating a morbid state of the alimentary canal, which has existed previously to the employment of purgatives, and which purgatives alone will relieve; and thus the use of these remedies has been prematurely relinquished, and even severely reprobated. If the purgatives occasioned the state of the evacuations now described, the continued employment of them must invariably increase the quantity of mucus excreted instead of diminishing it, and augment disorder instead of removing it,—circumstances which never occur, when purgatives and laxatives are judiciously administered.

Not only has this particular mucous or gelatinous state of the stools been ascribed entirely to the purgatives used, but the greenish hue of the evacuations has also been imputed to the same cause; namely, to the influence of calomel, when that particular purgative has been prescribed. That calomel actually has the effect of giving a greenish tinge to the alvine evacuations, I will not deny; but I do contend, from an experience of this remedy as extensive as has ever been enjoyed by any single practitioner, that, when it gives a

greenish tinge,—whether of a very dark or of a very light hue, or of any intermediate tint,—to the alvine evacuations, the secretions poured into the alimentary canal are of a morbid condition, requiring purgatives to carry them out of the system, and mercurial alteratives, or medicines operating in a similar manner, to restore the secretions to a healthy state.

When mercurial preparations, especially calomel, mix with the morbid secretions lining the alimentary canal, and with the biliary and pancreatic juices, and more particularly if the bile have been detained for some time in the gall-bladder, or have otherwise acquired greater consistence, a deeper colour, and more acrid properties, a greenish tint of the evacuations is generally remarked, the deepness and darkness of the colour depending upon the quantity of bile, and the condition of the secretions of the bowels and of the functions of these viscera generally: but this condition is less to be imputed to the particular kind of medicine prescribed, than to the morbid condition of the matters collected in the bowels on which it acts. That such is the case, is proved by the circumstance of the stools assuming a healthy character after this particular purgative has been employed sufficiently long to carry off the morbid secretions and accumulations existing in the *prima via*, and to correct the disordered state of function whence these conditions proceed.

Of the importance of attending to the functions of the bowels, and of removing all morbid secretions and accumulations which may form in them, little more may be added. The advantages of the practice, as far as relates to the most prevalent disorders of temperate climates, have been pointed out, and ably insisted upon, by Dr. Hamilton and Mr. Abernethy. And if these considerations are deserving attention in temperate countries, how much more important, and how much more deserving notice, are they in respect of the circumstances in which the European constitution is placed in warm countries? There, the secreting functions of the liver and digestive mucous surface are augmented, and the secreted fluids themselves are frequently separated, of a morbid quality, or have a tendency to assume such a condition soon afterwards, if they be retained even for a short time in the animal frame. As respects the various excrementitious parts of the alimentary substances received into the stomach, and other matters poured into the alimentary canal for the purpose of being evacuated from it at stated periods, it may be remarked generally, that if the retention of them be even but for a short time, various morbid changes must be

induced, owing both to the nature of these matters, and the morbid disposition of the surrounding and containing viscera, resulting from the unnatural circumstances in which the individual is placed, when transported to a climate foreign to his constitution, and often abounding with the causes of disease.

SECT. II.—*On the Treatment of Accumulations in the Large Bowels.*

The indications of cure, either when the bowels are loaded with morbid secretions, or other fæcal matters, are sufficiently obvious. The practitioner has merely, in the *first* place, to endeavour to remove them by means of those purgatives which seem the best suited to the particular features of individual cases; and when this end is accomplished, he ought, in the *second* place, to lay down such a plan for the observance of the patient as shall prevent the return of this species of disorder.

In attempting to accomplish the first part of the treatment, the majority of practitioners, either deceived by the reports of the patient, or misled by the appearance of the stools procured by the first doses of the purgative medicines employed, generally stop far short of the point to which the use of these remedies should be carried. Two or three doses of purgatives are administered, and then the use of them relinquished. This is a practical error: the purgation should be persisted in, until the morbid secretions are removed and corrected, accompanied with such other remedies and regimen as may promote the views with which they are exhibited, and preserve the strength of the patient. In giving purgative remedies, the practitioner within the tropics has generally more than one object to accomplish. The most important of them, perhaps, is to remove the accumulations lodged in the *prima via*, particularly in the cæcum and colon. The next is to increase the secretions proceeding from the mucous follicles, to remove obstructions from the mouths of their ducts, and to augment the discharge from the digestive mucous surface generally.

Purgatives are commonly prescribed according to the views of the physician respecting their mode of operation: thus, calomel is usually adopted when the secretion of bile is deficient; aloes when the large bowels require to be fully emptied; and scammony, gamboge, colocynth, and the cathartic salts, when we wish to procure an increased secretion from the mucous surface of the intestines, and watery motions. The propriety of attending to the particular

mode in which purgatives operate their usual effects, is of obvious advantage in practice; and in no class of disorders is it more necessary to attend to such distinctions than in those characterised by morbid accumulations in the large bowels. In these complaints, a very obvious benefit usually results from employing those purgatives which procure a full, bulky, but not frequent evacuation of the bowels: such remedies generally restore strength when it sinks from the presence of fæcal matters, instead of lowering it still farther—a consequence frequently following upon the use of such purgatives as give watery motions merely: the former, even although persisted in for a long period, impart tone to the bowels, and restore their natural functions; whilst the latter are more apt, when frequently repeated, to exhaust the patient, and to diminish the natural energy of the alimentary canal.

This distinction is one which every young practitioner should distinctly comprehend before he takes charge of Europeans in warm climates. Dr. Hamilton, in his valuable work upon purgative medicines, very distinctly states, with reference to similar states of disorder that "purging will undoubtedly debilitate the body, by causing a flow of fluids greater than usual into the cavity of the intestinal canal, and probably by hurrying off the chyle, and precluding its passage into the system. It is in this manner useful and advantageous in some diseases. This effect, however, is not required in the diseases which are the subject of the following observations, in which the sole intention is to evacuate the contents of the bowels, which, being out of the course of the circulation, are in a manner already extraneous to the body. Purgative medicines, given under this condition, will not induce debility: on the contrary, in the state of disease of which I treat, the bowels, being excited to expel their contents, their functions are restored, appetite and digestion are improved; and the patient, so far from being weakened, is nourished, supported, and strengthened."

That such effects should follow upon the judicious employment of purgatives, is to be inferred from *à priori* reasoning; that they actually take place in practice, is now an established truth in medical science. Those morbid secretions which rapidly form upon the internal surface of the large bowels of debilitated subjects in warm climates, generally diminish the powers of life in three ways: *first*, by impeding the function of chylifaction; *secondly*, by obstructing the passage of chyle into the absorbing vessels; and, *thirdly*, by diminishing the vital energy of the surface on which it lodges. Now it must be obvious that the continued use of

those purgatives which are most efficient in detaching those morbid secretions from the surface to which they adhere so prejudicially, and which evacuate them from the system in the most complete and safest manner, must, by removing the obstruction occasioned by them, and by abstracting agents acting injuriously on the vital energy of the parts with which they are in contact, most efficiently promote the return of the natural actions of these viscera, and restore the health of the system.

The able author already quoted very justly remarks, that "constipation and accumulation of fæces demand this stimulus (of purgatives) to restore the healthy state of the intestines, and to promote the expulsion of their indurated contents. In proportion as these objects are accomplished, the stimulus from the same purgative becomes more and more powerful; and so little is the necessity for continuing it, or for increasing its dose, that, on the contrary, were not the activity of the purgative diminished, or were it not withdrawn altogether as convalescence advances, we should be in danger of inducing weakness by excess of purging."

In many cases of long-neglected complaints of the digestive organs, the internal surface of the bowels, particularly of the cæcum and cells of the colon, become so thickly coated with a tenacious and thick secretion, giving rise to disorder of the *prima via*, or of some remote organs, as to require the continued and energetic action of those purgatives more especially which procure full and bulky evacuations, before a healthy condition of the system is restored. It is precisely in cases of this description that full doses of calomel, given at bed-time, operate so beneficially; for this medicine produces its purgative effects, by dissolving the tenacious secretions, by promoting the biliary secretion, and by increasing the secretions of the mucous surface generally,—thus preparing the accumulated matters, and the bowels themselves, for the operation of the purgatives which may be subsequently prescribed.

The particular kinds of purgative medicines which should follow the exhibition of the calomel deserve attention. Such as procure full, but not frequent motions, are preferable to others; the compound jalap powder, the bitter aperient mixture, castor oil, the compound decoction of aloes with the addition of some purgative tincture, rhubarb and magnesia, and the compound aloes pill, or the aloes and myrrh pill, according to the circumstances of the case. When, in addition to the mere discharge of the fæcal matters, we wish also to promote the secretions of the intestinal canal, the combination of calomel with the compound extract of colocynth, with

the compound aloes pill, or with jalap, may be requisite; or the exhibition of calomel may be followed by the usual draught, consisting of the compound infusion of senna with some neutral aperient salt, or by the bitter aperient mixture, with the addition of a small quantity of the sulphate of magnesia.

In all cases where the removal of tenacious matters from the bowels is necessary, the practitioner should not hesitate in persisting in his object until the stools assume a healthy character; nor should he be misled by the appearance of healthy motions from the operation of the first doses of purgatives which he has prescribed; for he shall often find that, although the stools are at first apparently natural, yet the continued operation of these medicines will succeed in bringing away morbid matters long pent up in the cæcum and cells of the colon, having a very dark or marbled appearance and putty-like consistence. In such cases, the indication is clear, and the continued action of purgatives obviously requisite. But when the stools contain the glairy, gelatinous, and viscid mucus already referred to, much more doubt is apt to attach itself to the mind of the practitioner; and he is more prone to be diverted from his object by the supposition that the state of the stools is the consequence of the purgatives employed. The source of this appearance of the motions I have already attempted to explain in the foregoing section; and even when it does not proceed from that source, it is to be imputed to the presence of some other cause of irritation in the *prima via* than the purgative prescribed. In cases of this description, although the practitioner ought to be aware of the possibility of the glairy mucus found in the stools being the effect of irritation from the purgative employed, and should watch the symptoms attending its operation, he must not be diverted from his object, but should employ those medicines which fully evacuate the bowels without occasioning marked irritation of them; for either the mucous glands are loaded and require to be evacuated of the secretions accumulated in them, or the internal surface of the bowels is surcharged with this substance, or some irritating matters are lodged in the cells of the colon inducing a morbid secretion of mucus in these situations; in either of which cases, purgatives are indispensably requisite.

When the motions are of the kind now referred to, injections of those substances which gently excite the large intestines to evacuate fully their contents, while they soothe any morbid irritation which may exist in them, ought to be resorted to from time to time. The judicious and repeated employment of laxative enemata promote

the operation of purgatives given by the mouth, soothe the irritated state of the colon, relax irregular contractions of this bowel and dissolve hardened fæces and tenacious secretions lodged in its cells. Where there is reason to suppose that any one or more of those states exist, this mode of treatment should never be dispensed with, and must be repeated or persisted in according to the particular features of individual cases.

In those cases where the motions assume a greenish hue or spinage-like appearance after the administration of calomel, we should be assured that, although the mercurial preparation may be partly concerned in the production of this colour, the secretions of the intestinal canal, and even of the liver, are chiefly in fault. It is a most serious error to forego the use of purgatives in such cases with the belief that the state of the stools proceeds from the medicines employed; on the contrary, this appearance indicates the propriety of continuing the purgative plan of cure until the motions become of a natural character. In the majority of cases of this description, the bile may be either secreted of a morbid quality, or it may have been lodged for a considerable time in the gall-bladder; but the secretions proceeding from the follicles of the bowels are undeniably disordered. Such being the case, as may be determined by the observation of every competent observer, what plan of cure can be adopted to remove this pathological condition excepting a well-regulated course of purgative remedies, and the adoption of those medicines belonging to this class which act by procuring the full evacuation of the contents of the bowels, and which promote and correct the secretions of the liver and of the follicular glands seated in the intestinal canal? It is owing to this mode of operation that calomel and other mild preparations of mercury, given either with a view to their purgative or their alterative operation, are generally found, when judiciously prescribed, so very beneficial, more particularly when either combined or given alternately with the other purgative remedies already mentioned. When it is desirable to evacuate the large bowels fully and quickly, in order that the morbid secretions and fæces may not injure the sensible surface of these viscera by remaining in contact with it, then purgative injections may be also employed. When, on the other hand, the morbid condition of the secretions seem to irritate and inflame this part of the intestinal canal, those injections possessing a soothing and emollient quality ought to be adopted. If there be reason to suppose, either from the presence of tenesmus and griping, the mucous state of the stools, or the apppearance of broken-down or hardened

fæces, or scybala, that indurated fæces or morbid secretions are lodged in the cells of the colon, then the injections should have an aperient as well as a solvent effect. In cases of this description, the soap injection with or without the addition of castor or olive oil, the decoction of barley with the soda tartarizata, the infusum lini with the carbonate of soda and assafœtida, the decoction of marsh-mallows with olive or castor oil, and the infusion of camomile flowers with the soda tartarizata or the carbonate of soda, and other substances of a similar nature, may be adopted according to the particular circumstances of the case.

The advantages resulting from the use of injections of this mildly aperient and solvent kind are very manifest in practice; for they may be frequently employed without risk of disorder, they soothe pain and irritation when these are complained of, and solicit a gentle yet full operation of the bowels, without occasioning fruitless and debilitating efforts at evacuation. Besides, where indurated fæcal collections are formed, and are retained by irregular contractions of portions of the colon or rectum, the mildly aperient injections often operate beneficially as an adjuvant of the remedies taken by the mouth, especially in removing these spasmodic contractions, and in allaying the irritation which occasioned them.

When the retention of accumulated matters in the large bowels arises from spasmodic contractions of the lower portions of the colon and of the rectum, then the mildest purgatives should be given, and be combined with antispasmodics: of these latter the hyoscyamus, the compound galbanum pill, preparations of ammonia and of camphor, æthers, and others of a similar nature, have generally proved useful; and whilst they tend to promote the operation of the purgatives with which they are combined, by removing spasm, they have a very beneficial effect, in debilitated patients especially, by preventing also the sinking sensations which often attend upon the necessary operation of purgative remedies. In cases of this description, the enemata administered should be of a similar description to the aperients prescribed, and should be combined in the same manner. Where much debility is present, the combination of nutritive substances with very gentle aperients and antispasmodics is often advantageous.

In the majority of cases wherein accumulations in the large bowels occur, the weakened state of the whole digestive apparatus generally requires a due portion of care. The patient's strength should be supported by requisite nourishment, in order that the purgative plan may be pursued to its ultimate object,—the removal

of morbid secretions and accumulations, and the restoration of the healthy functions of the intestinal canal. In many cases, a light, nutritious, and moderate diet, is all that is necessary, in order to support the energies of the system: in others, however, a small allowance of wine, or any other beverage to which the habits of the patient have accustomed him, is requisite; and in some cases, it is necessary to combine the aperient or purgative remedies, either after these medicines have been employed for a time, or from the commencement of the treatment, with tonics and stimulants. The combination of the compound infusions of senna and gentian is remarkably beneficial; also the decoction of bark with the tincture of senna and salts; the compound decoction of aloes combined with the infusion of columba and the infusion of columba with that of senna and tincture of aloes.

With regard to the proper time of exhibiting purgative remedies, I may further remark, with reference to the disorders now under consideration, that the alterative doses of medicine, and purgative or eccoprotic pills, should be given always at bed-time, particularly when doses of calomel, or other preparations of this mineral, are exhibited, and a purgative draught early in the morning. By this arrangement, the rest of the patient will not be disturbed, and two or three evacuations will generally be procured before mid-day; thus allowing the patient to continue those avocations which are requisite, or those employments and amusements which are often beneficially resorted to during slighter ailments: thus, also, the periods at which the usual meals are taken are not interfered with, and the functions of digestion not offended by the presence of medicine and the usual articles of food about the same time. During this plan of treatment, the regimen of the patient should be strictly laid down with a due reference to what has been already said: and the purgatives, varied according to circumstances, and differently combined, ought to be regularly continued until disorder ceases.

Having fulfilled the *first* indication of cure, the *second* becomes next the object of medical treatment. In respect of this part but little need be added. The patient should be directed to attend particularly to the state of his bowels, and to the functions of digestion. Gentle tonics combined with aperients ought to be resorted to whenever the functions of the stomach flag; and the operation of the bowels may be promoted by means of an occasional dose of the blue-pill combined with the aloes and myrrh-pill, taken at bed-time, and followed, in the morning, by three or four spoonsful of the bitter aperient mixture.

SECT. III.—*On Disorders frequently depending upon the Accumulation of Morbid Matters in the Alimentary Canal, particularly in the Cæcum and Colon.*

The frequent occurrence of serious disorder in the bowels themselves, and in organs sympathising with them, in consequence of accumulations of morbid secretions and fæcal matters in the large bowels has already been alluded to; and I now proceed to claim the attention of the reader more particularly to this subject. I shall, *first*, notice certain occasional effects of such accumulations upon the position of the colon, and which, when induced, generally perpetuates the disorder whence it proceeded, and superinduces others; and subsequently consider those affections which are sympathetically related to the morbid condition of the *prima via*, and which are of frequent occurrence in warm countries.

On Elongation and unnatural Positions of the Colon.—Accumulations formed in the lower part of the colon, and the restraint which is often, but very improperly, imposed upon the inclination to stool tending farther to increase such accumulations by frequent repetition, induce irregular flexures and displacements of portions of the colon, and even an elongated state of this viscus. I believe that the supervention of these consequences is favoured by a relaxed state of the mesocolon, the peritoneal covering of the bowel, and more particularly of the longitudinal bands which constitute a peculiar feature in the conformation of this viscus. We often find, in cases of old herniæ, considerable displacement and elongation of the colon, and a stretched appearance of the peritoneum and mesentery, particularly in certain places, and yet the parietes of the bowel will be free from morbid change. By the impaction of hard fæcal matters about the sigmoid flexure of the colon, from whatever cause resulting, an analagous condition is apt to supervene, and that part of the bowel, at the place where the obstruction exists, will be carried lower into the iliac region or into the pelvis by the increased action of the parts above; which action frequently repeated, or continued for an unusually long time, necessarily leads to partial displacements, elongation, and unnatural flexures of the bowel.

When unnatural flexures are thus formed, or the natural ones increased to the state nearly approaching to convolutions of the bowel, morbid accumulations are more readily and more frequently

produced; and, when once formed, very dangerous diseases of the colon itself and of the neighbouring viscera often supervene. Of these, inflammation of the bowel, accompanied with the usual symptoms of dysentery, is the most frequent; and next to it inflammation of the small intestines and of the liver.

In many cases, also, the obstruction thus placed in the way of the regular flow of the alimentary and secreted matters along the lower part of the digestive canal, even when it fails of inducing active inflammation, occasions a stagnation of the contents of the small intestines, with various severe dyspeptic symptoms and congestion and consecutive diseases of the liver, attended in several instances with hypochondriacal symptoms, which may terminate in melancholia and insanity in persons having a predisposition to those affections. That these latter consequences may result from accumulations in the large bowels, has been satisfactorily demonstrated by the histories of numerous cases of this description which have come under my observation and by the successful issue of the treatment adopted for their cure.

With respect to the particular treatment which may be adopted in cases where displacement or irregular position of the colon exists I have but little to advance. It must be admitted, that during the life of the patient there are no symptoms indicating the existence of this condition which may not equally proceed from other kinds of disorder. The treatment, however, which is applicable to this derangement is also appropriate to others seated in the same viscus, which are manifested by similar signs, and characterised by alvine obstruction: hence the observations made respecting the removal of accumulations of morbid matters in the large bowels, are perfectly applicable to the species of derangement now under consideration. When, however, there are great tension and fulness in the abdomen, occasioning general distress, restlessness, and oppression in the chest, with uneasiness in the head, irregularity of the bowels and watery discharges by stool, without any of those symptoms that mark increased arterial action, we may fairly infer the existence of either displacement or constriction of the bowel. Either condition will produce these symptoms; and both equally require the fæcal contents to be kept in a fluid state, to enable them to pass along the canal. Here, however, if the nature of the disorder were cognisable during the life of the patient, the use of purgative or laxative enemata is particularly appropriate: whilst an assiduous attention should also be paid to the preservation of a fluid state of

the evacuations and a regularly open state of the bowels, by means of laxatives taken by the mouth, and of emollient and gently aperient injections.

On Hypochondriasis, Melancholia, and Mental Alienation, in connexion with Accumulations of Morbid Matters in the Bowels.—Accumulations of excrementitial matters form in the large bowels generally in consequence of a low state of the vital energies of these viscera, and when they thus form, their presence tends most essentially to increase the morbid condition in which they originated, and to augment the debility of the frame generally. When deficient tone of the alimentary canal is followed by the generation and retention of morbid secretions and fæcal matters in the large bowels, the mental faculties not unfrequently become disordered in various grades, from the slighter shades of hypochondriasis, through the advanced stage of melancholia, until complete insanity is established. It seems very probable that the morbid secretions and excrementitious matters allowed to accumulate in the large bowels depress the powers of life, and lower the energies of the nervous system, at the same time that the irritation these substances produce upon the mucous surface of the bowels excite, in a sympathetic manner, the circulation in the membranes and substance of the brain.

M. Esquirol has stated that, in one hundred and sixty-eight cases of melancholia examined by him after death, he found displacement of the colon in thirty-three, the transverse arch of this bowel generally hanging down into the hypogastric region. Now whether this derangement proceeded from accumulation of fæcal matters in this viscus, or from great relaxation and want of tone of its coats and peritoneal covering, the necessary consequence of this condition must have been, in every case, to have favoured an unnatural retention and collection of fæcal and excrementitious matters in the bowel, and to have generated disease in the mucous surface on which they lodged, inducing sympathetic disorder in various parts of the system, more particularly in the brain itself.

This effect, although not necessarily or generally proceeding from morbid accumulations in the *prima via*, yet in those who are suffering from mental anxieties, who have experienced disappointments, who expose themselves to the direct rays of the sun, and who have an hereditary disposition to mental disorder, will very frequently supervene. And although the practitioner is not to consider morbid accumulation in the large bowels as the only, or even

on many occasions, as the chief physical derangement to which he ought to direct his remedial means, he should, nevertheless, pay sufficient attention to the pathological state now pointed out, more particularly as the indications of cure to which it leads are amongst the most important by which he can guide his practice, and, when decidedly acted upon, perhaps the most successful in its ultimate issue.

The ancients, although bad theorists, were nevertheless, attentive observers of nature. They have very stongly advocated the necessity of active and continued purgation in mental disorders, more especially in melancholia, and for this purpose employed the most active vegetable cathartics, particularly hellebore, conceiving that purging off black bile would remove the disease, which in their opinion, depended upon a depraved state of this fluid. But although they were mistaken in respect of the particular source whence this morbid and black secretion proceeded, yet they were by no means wrong as to its existence. In a very great proportion of cases of melancholic alienation of mind, and indeed in other forms of mental disorder, the stools procured by means of active purging are very dark, tenacious, and even of a pitchy blackness, resulting, as I conceive, from the accumulation and admixture of the various secretions, excrementitious matters, and imperfectly digested food, poured into the alimentary canal, and from the changes they have undergone during their retention in that situation.

With this view, I have always made it a point, to institute a most active and uninterrupted course of purgative remedies in conjunction with those other means which act directly in restraining the morbid action secondarily induced in the brain. Thus, while I have prescribed for months, without interruption, the use of purgative or laxative medicines daily, I have also directed general or local blood-letting, according to the circumstances of the case, when there appeared to be more blood circulating to the head than natural; and in cases characterised by deficient tone of the system and by exhaustion, I have exhibited tonic and cordial remedies, both with a view of supporting the energies of life, and preventing exhaustion during the full and requisite operation of the purgatives prescribed. In those cases where increased determination of blood to the head is remarked, the continued operation of purgatives acts beneficially in a twofold manner,—they both remove morbid accumulations from the bowels, and they divert the current of circulation from the brain to the viscera on which they act.

Melancholia and mental alienation which so frequently occur in Europeans in warm climates, as far as my experience has extended, have always been benefited by the energetic employment of purgatives. In all these cases, the employment of purgatives brought away most abundant motions of a very dark, tenacious, and offensive description. In some of them, the purgative plan had been continued for many days and even for several weeks before it succeeded in detaching the morbid secretions adhering to the coats of the bowels; but, in every case, disorder began to yield as soon as these were carried off, and the motions to assume a healthy character.

In these cases, the practitioner should not intermit for a single day the exhibition of medicines which tend to evacuate the bowels, and promote the discharge of the morbid alvine accumulation until he succeed in procuring discharges similar to those above alluded to, and in improving the secretions. Nor should he consider, although the colour of the motions may not appear materially morbid, that they are not in other respects very remarkably deranged. They are often very offensive, of a peculiar disagreeable odour, and when minutely examined, they are observed to be tenacious, like bird-lime, of a putty-like consistence, and streaked with various shades of colour. The minute examination of the alvine evacuations is a point of the utmost importance in practice, more especially in the disorders under consideration.

On the presence of Worms in the Large Bowels.—Intestinal worms are very frequently met with in practice within the tropics; and are not only a frequent disease of themselves, but also a cause of other diseases, especially amongst the natives of Hindostan. When occurring amongst Europeans, they are generally the consequence of torpid function of the large bowels, and of accumulations of morbid secretions and fæcal matters in this part of the alimentary canal. Ascarides, lumbrici, and tæniæ, are the kinds of worms most frequently observed, more particularly the lumbrici. They sometimes occasion no marked symptoms; at other times, the usual signs indicating their existence in the *prima via* are well marked. In the natives of India they are often either productive of various functional and symptomatic disorders, or are complicated with them. Indeed, very few cases of disease are met with amongst the Hindoo population, where intestinal worms are not found in the alvine evacuations procured during medical treatment.

Cases of asthenia, dyspepsia, colicky pains, diarrhœa, vomiting, pains of the head, of the upper and lower extremities, pains of the

back, slight fever, hæmorrhoids, rheumatism either with or without fever, epilepsy, hemeralopia, or marasmus, are frequently observed as the consequences or concomitants of worms in the large bowels and of morbid accumulations in the same situation; the worms being, in all these cases, evidently the consequence of the morbid secretions formed upon the digestive mucous surface; and the disorders enumerated above being symptomatic of this state, as well as of the irritation occasioned by the worms themselves.

In India, and in warm climates generally, the *predisposing causes* of worms are present in a very remarkable manner. Of these, the slender and delicate constitutions of the natives; the relaxed state of their fibres, and their asthenic habit of body; their glutinous, viscous, and farinaceous diet; the moist and relaxing state of the atmosphere; the nature of the soil and particular situations, and the great exuberance of the vegetable creation covering them in warm countries, and the consequently impure states of the atmosphere, are particularly deserving notice. Many of the predisposing causes of verminous disease operate upon Europeans who have removed to those climates, as well as upon the natives themselves. Indeed, the influence of the climate is such as tends to assimilate in many respects the constitution of the former to that of the latter, and thus to predispose to the same general pathological conditions of disease. When, therefore, the European residenter in warm climates is weakened by attacks of acute disease,—by living in moist and low situations,—by the use of impure water,—and by other concomitant causes of disease, abounding in an intertropical country,—he becomes extremely obnoxious to the invasion of intestinal worms, unless he attends with uniform care to his digestive functions, and preserves an open state of his bowels; thereby preventing the accumulation of morbid secretions and fæcal matters in the cæcum and colon.

It will generally be found amongst the natives of warm climates, and among those Europeans who have been much weakened by their residence in them, that the secretions, which form the principal part of the fæcal discharge, are seldom thrown off from the mucous surface of the large bowels in so quick a manner as in the robust individual, who enjoys an energetic state of the circulation and of all the organic functions; and being thus retained, they form at least the soil in which worms are reared, whatever may be the primary source whence these creatures proceed. Hence the importance of endeavouring to prevent the retention of morbid

secretions and fæcal matters, and to impart energy to the digestive functions generally.

The possibility of worms perforating the parietes of the intestines has been contended for by some pathologists, and denied by others. Without pretending to decide the question, I shall adduce the particulars of a case which came under my notice, in which the parietes of the bowel must have been perforated by them; but whether the perforation was effected previous to inflammation and ulceration having been excited in the part of the intestine in which they were lodged, or subsequently to that event, is a point which cannot be determined, from the imperfect history of the case, to which I was called only in its last stages.

"*August* 5, 1820.—J. W——, four years of age, began to complain, about three months since, of swelling and hardness about the umbilicus, with pain on pressure. Opening medicines were prescribed; and afterwards, finding that the tumour did not subside from their operation, poultices were applied. From the middle of April, the time at which the hardness was first detected, until the end of July, it gradually increased. The bowels, however, were always regular, and the appetite unimpaired. During July the swelling had increased considerably, was fluctuating, and slightly inflamed. The child's temper became irritable, and considerable symptomatic fever, with loss of appetite and cerebral irritation, supervened. Animal food was now abstained from, and saline diaphoretics and laxatives given. On the 1st of August the abscess broke through two openings in the umbilicus, and discharged a great quantity of thick offensive matter. On the 2d, about a pint of yellowish watery fluid was discharged, with some thick offensive matter, similar to that which passed on the preceding day; and as a substance appeared to protrude through the aperture, which the father of the child fancied was the bowel itself, he became alarmed, and sent for me. I immediately drew from the opening two large lumbrici. This was the first time of my seeing the case. The child lived several days: the fæces, with eight or nine large lumbrici, passed through the opening at the umbilicus, and very little by the anus, during this period.

"*On examination*, the lower part of the ileum was found obstructed, its convolutions agglutinated together, and its canal, in parts, constricted to the size of a goose-quill. It presented no marks of recent inflammation, and was of a pale colour, both exter-

nally and internally. The agglutinated mass of small intestines adhered also to the abdominal parietes, around the umbilicus; and one of the most superficial convolutions of the intestine had an ulcerated opening through it, communicating with the external aperture at the umbilicus. The other abdominal viscera were natural in appearance."

With respect to the *treatment* of worms in the bowels, I have little to add to what is very generally known on the subject; the propriety of commencing, in cases of this description, with purgatives, especially those which possess an anthelmintic property, and continuing the exhibition of them as long as the evacuations possess a morbid character, is well understood, and generally acted upon. In many habits and constitutions, however, more particularly amongst the natives of India, purgative anthelmintics will not always succeed in removing worms, and certainly have little effect in preventing their regeneration. In such cases, therefore, purgatives should be combined with other remedies which experience has shown to have considerable influence in expelling worms from the body, and preventing their regeneration. So long, however, as the mucous surface of the bowels is covered with mucous sordes and morbid secretions, and the cells of the colon are loaded with fæcal matters, purgatives which act most efficaciously in removing those collections are indispensably requisite. It is chiefly from their activity in removing those accumulations, that calomel, jalap, aloes, castor oil, senna, rhubarb, injections of turpentine, hellebore, and some other remedies, are generally so beneficially employed in cases of worms.

After the above remedies, combined according to the peculiarities of the case, have been exhibited, I have generally prescribed enemata of the oil of turpentine and castor oil with great advantage; and, after the fæcal accumulations and morbid secretions have been removed by the above means, I have always resorted to the use of tonics combined with laxatives with very manifest advantage. In cases of this description, after fæcal collections have been removed, the different preparations of iron are very serviceable, and in many cases, when combined with laxatives, have succeeded in procuring the expulsion of worms, after the more active purgatives have been employed for a very considerable time.

Amongst the natives of India, the preparations of iron combined with tonics, or with anti-spasmodic anthelmintics, such as assa-

fœtida, myrrh, camphor, or with laxatives and purgatives, as rhubarb, sulphate of potash, jalap, &c. are generally beneficially prescribed from the commencement of the treatment. When, however, they are not combined with purgatives, it is generally requisite to give purgatives in the intervals between their exhibition. Amongst this class of the community the combination of purgative medicines with warm cardiacs, tonics, and stimulants, is absolutely required in almost every case of disease, but more especially in those depending upon the presence of worms in the *prima via*, as a great majority of their ailments depend upon this cause. These means are adapted to cases of ascarides and lumbrici. In the former, however, I generally found enemata very serviceable. In cases of tænia, the oil of turpentine, given by the mouth or by injection, has been the most successful remedy in my practice. I have also given the bark of the root of the pomegranate-tree with very considerable benefit, both in the form of decoction and powder, as frequently employed by the natives of India, and as recommended by Dr. Fleming and Mr. Breton.

Hemeralopia, or Night Blindness.—This affection is very frequently observed between the tropics, more especially amongst the natives of India. It has generally been supposed to depend upon a torpid condition of the retina, following the strong stimulus of light, and it has likewise been imputed to the state of the sensorium. Whether either of these opinions be correct, or whether both states actually obtain, I shall not attempt to decide. Whatever affection may be superinduced in the sensorium or in the retina, giving rise to this particular derangement of its functions, I believe to depend upon debility, accompanied with accumulation of morbid secretions in the *prima via*, more particularly in the cæcum and colon, together with torpid function of the liver and stomach. The disease among the natives is generally induced by insufficient nourishment, and want of attention to the functions of the bowels.

I have found a well-regulated diet and purgative medicines sufficient for the removal of hemeralopia, frequently without the assistance of any other remedy. Amongst Europeans, these medicines are the most unequivocally necessary; for the bowels of those labouring under this affection are often particularly torpid, and require the most active purgatives to produce any effect upon them. However, after the energetic employment of these medicines for two or three days, they generally succeed in bringing away copious, offensive, dark-coloured, gelatinous, or otherwise morbid stools,

when the bowels become more sensible to the stimulus of purgative remedies, and smaller doses or gentler means are then sufficient to produce the requisite effect.

During the employment of purgatives for the cure of hemeralopia, it is very usual to observe worms passed in the stools. Among the natives of India, the presence of worms in the *prima via* of those complaining of this affection is extremely common. I am, however, inclined to view this circumstance as chiefly one of coincidence rather than as one of cause and effect; or, in other words, I consider that the insufficient nourishment, and the functional disorder of the *prima via*, leading to the accumulation of sordes and morbid secretions in the large bowels, whilst they favour the generation of intestinal worms, will, in some cases, give rise also to the disorder of vision. Whether it be thus complicated or not, purgatives and a suitable diet are equally requisite to its cure; but in such complications more particularly, and in all cases more or less, the practitioner should endeavour to impart energy to the alimentary canal, after the morbid secretions have been removed by the course of purgatives already employed. If this indication be not acted upon, the re-accumulation of the morbid secretions will soon take place; and if there be a tendency to the formation of worms in the alimentary canal,—a tendency existing in almost all native Indians,—these animals will soon make their appearance again, and lead to farther disturbance in the system.

Hence it will be requisite, in the treatment of hemeralopia, to prescribe a nourishing diet and tonic remedies as soon as the morbid accumulations have been carried out of the system: but in all cases it will be necessary to combine the tonics with purgatives or aperients, or to give them alternately, so as to preserve a freely open state of the bowels during the tonic course. In some cases it will be also requisite to give, at intervals of six or seven days, a brisk purgative, in order to carry off whatever accumulations may have formed during the adoption of this latter part of the course of treatment. Indeed, in some cases of this affection occurring in the natives of India, the amendment will not be very rapid until a sufficiently nourishing diet be directed, and tonics be either added to the purgatives employed, or given in the intervals.

As to the purgatives and tonics found most frequently beneficial in hemeralopia, it may be requisite to offer a few remarks. A full dose of calomel given at bed-time, and followed early in the morning by the compound jalap powder or the compound infusion of senna with salts, I have usually prescribed at the commencement

of the treatment; and frequently promoted the operation of these remedies, by directing the injection of a purgative enema a short time after the exhibition of the opening draught. This plan has been generally continued daily until the stools assume a natural appearance, and been varied according as the character of the motions procured by the medicines improved. After three, four, or five days, the stools generally became less morbid; when, instead of the large doses of calomel, alterative doses only were prescribed, generally in combination with aloes, or the aloes and myrrh pill; and the bitter aperient mixture, so as to preserve a free action of the bowels, until the disorder was removed, and the alimentary canal assumed its natural functions.

When this affection is complicated with worms in the alimentary canal, smart cathartics, followed by cathartic enemas, are at first requisite, until the viscid and tenacious sordes in which the worms are usually lodged are removed; after which the treatment recommended for worms should be pursued steadily until the functions of the digestive organs are restored, and the countenance and habit of body assume a more healthy appearance. But our attention should not terminate with the attainment of this end. It must be recollected, that the disorder of the alimentary canal, from which the affection under consideration proceeds, is very apt to return, if the actions of this part of the economy be not promoted, from time to time, by the employment of suitable medicines. For this purpose, tonics in combination with aperients should be perscribed, and the regular functions of the bowels attended to on the part of the patient as well as on that of his medical adviser. In this particular description of cases, rhubarb in conjunction with the sulphate of iron and a little powdered ginger, as a corrigent, is extremely beneficial, and, when taken to a sufficient extent to act gently upon the bowels, tends most essentially to prevent the accumulation of morbid secretions and the generation of worms, and to restore the strength of the patient.

I have often resorted to the application of blisters behind the ears and on the temples in this affection; but although benefit has occasionally resulted from the practice, it is to be viewed rather as an auxiliary than as a principal means of cure. If the patient complain of headach, or if there be symptoms of congestion of blood in the head, as indicated by fulness of the countenance, injection of the conjunctiva, weight of the head, or heaviness, &c., leeches should be applied, and efficient purgatives administered.

On Accumulation of Morbid Matters in the Bowels, as a

cause of Nervous and other Ailments.—In the preliminary observations on the subject of fæcal accumulation in the large bowels, I have already pointed out the general outline of the relations which a morbidly distended colon has with the other abdominal viscera; and I shall now proceed to offer some remarks upon the disturbance which results to the economy in consequence of this state of the large bowels, particularly when it is accompanied with collections of excrementitious matters in its cavity.

When the cæcum and colon are loaded, the functions of adjoining viscera are more or less disturbed, in consequence of the pressure to which they are thereby subjected. The loaded and distended cæcum presses upon the right iliac vessels and nerves; and hence supervene pains of the right limb, and, in the more severe cases, a degree of partial paralysis is superinduced. When the accumulations take place in the sigmoid flexure of the colon, similar phenomena supervene in the left inferior extremity; and if the cæcum and sigmoid flexure of the colon are both loaded, as is not unfrequently the case, the disorder is extended accordingly to the right and left extremities. In addition to these symptoms, patients thus circumstanced frequently complain of pains in the loins, with occasional disorder of the urinary secretion, which is generally of a deeper colour than natural, and either depositing a very thick sediment, or exhibiting a very thick, mucous-like cloud, or both. When the fæcal accumulations are carried to the greatest height, then, in addition to the above ailments, or even independently of them in some cases, an œdematous state of the lower extremities supervenes, with an inability to use them, or at least a difficulty in subjecting them to the least voluntary exertion.

These symptoms are often viewed either as constituting of themselves the disorder complained of, or as resulting from some other pathological condition than that now assigned. Nor do I deny that they are occasionally dependent upon other causes. I merely wish to point out the causes now under discussion to the practitioner, in order that he may investigate more closely the state and functions of the large bowels, in those cases wherein the above symptoms are present. If he examine carefully the state of the tongue, the appearance of the alvine evacuations, and the size, sensibility, and condition of the abdomen, he will generally be able to form an opinion as to the existence of that pathological state of the large bowels, for the presence of which, in ailments of the above description, I have contended.

To collections of morbid matters, and the consequently loaded

and distended states of the large bowels, attacks of rheumatism and gout are, I believe, often induced, particularly in those who are liable to these diseases, either from hereditary predisposition, previous attacks, or exposure to one or more of the concomitant and exciting causes whence they often spring. That the views thus entertained are correct in respect of these complaints, seems to be proved by the treatment which is found most successful in removing them; for, in the large majority of cases of this nature, it is uniformly found, that they soon yield after the morbid accumulation in the *prima via* has been carried off by a proper employment of purgative remedies.

But the functions of the lower extremities are not the only functions which are disturbed by collections in the large bowels, and distensions of these viscera. The actions of the liver are generally deranged at the same time with those of the large bowel. Indeed, in many cases the operations of this organ are the first disordered, the biliary secretion being either deficient in quantity, or in its stimulating properties on the bowels; and hence supervenes the torpid and relaxed state of the colon, favouring the formation of accumulations in its cavity. When, however, these accumulations are formed, and more particularly when they occasion any pressure upon the gall-bladder, the liver, or their ducts, and especially if they press at the same time upon the duodenum and stomach, or impede the functions of these viscera, the disturbance of the economy becomes more marked, and assumes the form of serious disease. In this manner, various dyspeptic disorders arise, and put on an acute character, not unfrequently being accompanied with slight jaundice, or terminating in this state, owing to the obstruction placed in the way of the flow of bile into the duodenum, as well as to the absorption of the biliary and other secretions during the retention of them in the bowels.

The distensions of the cæcum and colon, whether resulting from the generation of flatus, or from fæcal collections, or, as is most usually the case, from both, when carried to a great height, not only impede the functions of the organs with which these viscera are generally in contact; but also, by displacing, to a certain extent, adjoining organs, disturb their operations, and occasion disorder even of more remote parts. When the abdomen is distended by inflation or fæcal accumulations in the colon, particularly if the transverse arch and superior flexures of the viscus are the seat of disorder, the stomach and liver are pushed against the diaphragm, the descent of this organ is impeded, the liver and stomach are

thereby deranged in their operations, the cavity of the thorax is diminished in capacity, and hence proceed difficult circulation through the lungs, a quickened respiration and circulation, and not unusually a retardation of the return of blood from the head. In this manner various disorders, depending upon the condition of the heart's functions, are either originally produced or subsequently perpetuated; and the return of these ailments is very frequently promoted by the morbid condition of the bowels, now under consideration, acting most probably in the way pointed out. Various functional disturbances of the heart are occasioned in this manner, and the operations of the lungs themselves become also disordered, in those who are disposed, either from hereditary conformation or previous disorder, to derangements of these organs.

The same observations may also be extended to the functions of the brain. It is obvious, if it be admitted that the return of blood from the head may be retarded in the way pointed out, or the circulation in this situation in any other way deranged, that disorder of the functions of the brain and nervous system will supervene, to an extent depending upon the degree to which the original cause is carried, and upon the peculiar constitution and predisposition of the patient. The irritation, also, which accumulations of morbid matters occasion in the *prima via* is sympathetically propagated to the brain, and hence the more frequent dependence of disorders of the nervous system upon the condition of the alimentary canal. In this manner, attacks of melancholia and hypochondriasis, and even mental alienation, supervene in many instances; and the more usual forms of hysteria, epilepsy, chorea, paralysis, and even apoplexy, seem to be connected with, if not altogether dependant upon, the conditions of the large bowels which I have endeavoured to illustrate in the present chapter. The treatment of these diseases proves the accuracy of those views, inasmuch as it is notorious to every experienced observer, that a regular course of purgative medicines is indispensably necessary for their cure, that the alvine evacuations are generally morbid, and that recovery is seldom complete until they are restored to their healthy condition, whatever means may have been resorted to besides.

CHAPTER IV.

ON DYSENTERY.

In the observations which I shall have to make on this very important and prevaling disease, I shall, first, consider it in its simpler and less complicated forms; next treat of that variety which is characterised by attendant disorder of the liver; and afterwards offer some remarks on the chronic forms of the disease, and on the scorbutic dysentery which is occasionally met with in intertropical practice. I shall then inquire into the organic lesions or consequences which sometimes supervene to repeated attacks of the disease, or to neglected or injudiciously treated cases. In the remarks and illustrations to be offered under each of these heads, the advantage of having an early recourse to active treatment will be most apparent. The practitioner must not be led astray by imaginary distinctions of subordinate varieties of dysentery, or by opinions respecting the non-inflammatory character of one form, or the highly inflammatory condition of another. The mildest and least inflammatory to appearance may rapidly terminate in extensive ulceration, before the practitioner becomes aware of any danger, if the mere acuteness or activity of the symptoms be solely relied upon. In all cases, he should endeavour to ascertain the probable predisposing and exciting causes of the disease, and the particular habits of, and circumstances connected with the patient, as they will serve to throw considerable light upon the pathological condition of the disorder, the kind of means which should be resorted to, and the extent to which they should be carried.

Sect. I.—*On Acute Dysentery.*

The view I have endeavoured to exhibit of the functional disorders of the large bowels, which depend upon accumulations of morbid secretions and fæcal matters in their cavity, shows in a very remarkable manner one of the very earliest pathological states which gives rise to the form of disease we are now to consider. Collections of excrementitious matters tend very directly to irritate

the mucous surface on which they lodge, and to induce inflammation, followed by ulceration and even sphacelation, in a very short period, if the disease be neglected or injudiciously treated. In some cases these consequences will sometimes supervene, notwithstanding the use of the most decided means of cure; but this is chiefly owing to peculiarity of constitution, and to the causes and influences by which it has been affected.

In a great many cases, this form of dysentery is preceded by a constipated state of the bowels, often of long duration, especially among persons who have recently arrived in India. To this condition, often disregarded, frequently supervenes mucous diarrhœa, attended with pains of the abdomen, coming on at intervals, and generally preceding the alvine evacuations. This form of diarrhœa may continue for two or three days, passing gradually into dysentery, with all the characteristic signs of the disease. In a few instances, especially when the evacuations are copious, the diarrhœa subsides, and the patient recovers without experiencing, at least for that time, a true dysenteric attack. This result seems to arise from the irritation produced upon the mucous surface of the large bowels by the fæcal accumulations having subsided, in consequence of the irritating matters having been removed, by the copious secretion which had taken place.

Dysenteric symptoms are frequently present from the first hour at which the patient complains, the stools being then scanty, mucous, streaked with blood, and attended with abdominal pain and tenesmus. In cases of this nature, the increased action of the muscular coats of the bowel, especially about the sigmoid flexure and rectum, prevents the passage of the fæcal collections through their canal, and, in many cases, occasions a complete obstruction, little passing away but the perfectly fluid secretions. In cases of this description, if the disease be not early subdued by very decided treatment, sloughing of the mucous coat often takes place, followed by involuntary motions, when the fæcal accumulations at last come away, such parts of them, at least, as have been dissolved being washed off by the watery secretions poured out from the irritated vessels of the inflamed surface.

Having thus indicated one of the most frequent sources whence the acute and uncomplicated form of intertropical dysentery seems to arise, and believing it essentially to be an inflammatory disease proceeding from accumulation of morbid matters in the bowels, I cannot subscribe to the subdivision of the disease adopted by some writers, particularly by Mr. Bampfield, of whose opinions and

experience I entertain generally a very high opinion. I concieve that the subdivision of this form of dysentery adopted by Mr. Bampfield, is a refinement by no means warranted by the nature of the disease, leading to no advantages in practice, but, on the contrary, likely to mislead the practitioner, and, in some cases, to divert his mind from the adoption of a decided means of cure, when decision may be most requisite. The *mild*, the *severe*, and the *inflammatory* varieties which he has marked out, are, nothing more than varying degrees of the same, or nearly similar, pathological states, proceeding from the extent to which inflammatory action may have supervened from the susceptibility of the system to sympathise with the local disease, and from the peculiarity of individual constitution. There is no line of demarcation by which these varieties can be separated from each other in practice. The mild form may be, and indeed actually is, as much an inflammatory disease as that form which bears this designation, although the extent to which inflammatory action may have supervened is less, and its character, owing to the circumstances peculiar to the individual, less acute. The *severe* variety I likewise conceive to be essentially inflammatory, and differing only from the form on which Mr. Bampfield has imposed the term, as if it were *par excellence*, in the phlogistic character of the patient's constitution—the extent to which inflammatory action may have supervened in the colon, cæcum, and rectum—and the febrile action, generally of a synochal form, induced throughout the system.

Viewing, therefore, the acute and uncomplicated form of dysentery, as an inflammatory disease, limited chiefly to the cæcum, colon, and rectum, and varying somewhat in its phenomena, according to the extent to which inflammatory action has supervened in one or in all these situations, I shall proceed to detail its history, in the various degrees of severity which it usually presents in practice amongst recent comers to India, in older residenters, and amongst the natives themselves; keeping this circumstance, however, in view, that the disease is the same as to its nature, but differing merely in the degree of severity which, like all inflammatory diseases, it usually assumes.

Simple dysentery, in its least severe forms, generally commences with frequent calls to stool, the motions being scanty, mucous, gelatinous, streaked with blood, and accompanied with pain and tenesmus. At first the pain seems chiefly limited to the rectum, occasional griping pains being only felt in the abdomen. The tongue is often but little affected, farther than being white and loaded; the

pulse sometimes at the beginning not materially accelerated, but it generally soon becomes affected to an extent varying according to the habit of the patient and severity of the disease. If the disorder be not subdued in this early stage, all the symptoms become more acute; the pain in the abdomen increases in severity and is more constant, yet, in many cases, little or no pain is complained of, excepting at the time when the patient is passing a motion, although the stools are of the most morbid character, and the disease altogether of the most severe form. This, however, ought not to be imputed to the absence of inflammatory action; for the mucous surface of the cæcum, colon, and rectum, may be inflamed, and, indeed, in a state of ulceration, and yet but little uneasiness, even upon firm pressure of the abdomen, is apparently felt. This seems to be owing to the varying degree of excitability and sensibility with which the human frame is endowed, and, perhaps, to some modification in the condition of the diseased parts, beyond the detection of our unaided senses. Yet, in many cases, where pain is either entirely absent, or but little complained of, a sense of heat in the abdomen, especially in the course of the colon, is very generally felt. When this symptom is present, it ought always to be recognised as indicating the existence of inflammation of the mucous surface of the bowel. A similar inference ought also to be deduced from a sense of soreness in the abdomen. This symptom is very often present in all the stages of the disease, and always indicates great irritation of the mucous surface. It frequently accompanies the sensation of heat, or supervenes to that symptom.

As long as the disease is limited to the mucous lining of the large bowels, the patient seldom feels more than a sense of heat, or a dull aching pain, not increased on pressure, which he usually describes as being heavy, and shooting at times through the whole abdomen: but when the cæcum is minutely examined, pain, to a greater or less extent, is always felt, and, perhaps, some degree of fulness, even when pressure over the transverse arch of the colon occasions no uneasiness. If the left side of the abdomen, beneath the ribs, be grasped in the hand, so as to embrace the descending colon and sigmoid flexure, pain is sometimes felt, but not always; but when the right side is similarly grasped, so as to press upon the cæcum in opposite directions, then pain is almost always complained of.

As the disease advances, the stools usually become still more frequent, the tenesmus more severe, the discharges of blood greater and often more intimately mixed with the matters evacuated, which

gradually pass from a mucous, slimy, and gelatinous character, to a more watery appearance, of a dark colour, with a muddy solution of feculent matters, and sometimes with considerable discharges of fæces. The urine is now, and often early in the disease, of a high colour, voided frequently, and attended with scalding—sometimes complete strangury is present. The tongue becomes more loaded and excited; the pulse more accelerated; and the skin harsh, hot, and dry. Tormina also, and the straining, increase; the calls to evacuation become more incessant, especially during the night, when the general febrile symptoms also are augmented.

When the straining and tenesmus are very urgent, the rectum may be regarded as much inflamed: indeed, I know not of an instance where such a state was not evident when these symptoms were present. If tenesmus be very severe,—if the patient presents but little abdominal fulness or tension,—if he complains but little of tormina, or of heat and soreness in the abdomen,—if he can bear pressure without uneasiness being produced about the region of the cæcum and sigmoid flexure of the colon,—that disease is chiefly seated in the rectum, and the large bowel is comparatively exempt, or at least much less affected than the rectum. But although this inference may be drawn, especially if there be little constitutional disturbance present, we should never allow it to seduce us into the adoption of weak measures of cure.

I have often seen the most extensive ulceration in the cæcum and colon, and yet the patient had not complained of tenesmus, the rectum having been comparatively sound, and I have seen tenesmus to a great and distressing degree, the colon, throughout its extent, being, upon *post mortem* examination, found little disordered, and the disease confined to the rectum. From these circumstances, therefore, I have, during the latter years of my practice, especially when tenesmus has been urgent, considered it merely as characteristic of disease of the rectum, although frequently an attendant upon dysentery, and treated it accordingly, whether it arose at the commencement of the disease, or during the advanced stages.

When the disease affects the natives of India, the above symptoms are generally present, either alone or in conjunction with a frequent, small pulse, nausea, flatulency; sometimes vomiting of a porraceous or bilious character, and occasionally with a scybalous state of the motions. In them, the disease, although partaking of an inflammatory character, is generally less acute as respects the severity of its symptoms, usually exhausting sooner the powers of life; and hence it more frequently assumes a low or typhoid form, presenting, upon

the examination of fatal cases, the same appearances as are observed in many European subjects.

In the more severe attacks of the simple, uncomplicated dysentery, to which recent comers to India are very liable, the local as well as the febrile symptoms are generally of a still more inflammatory character. This, however, is chiefly owing to the more phlogistic diathesis, more rigid fibres, and greater irritability of the persons affected. In them, the sense of heat or soreness, the tormina, fixed pain, tension, and tumefaction of the abdomen, are very urgent; the tenesmus distressing; the tongue white, loaded, excited, and dry; the stools mucous, gelatinous, and streaked with florid blood; the pulse hard, quick, or full; the skin hot and dry; the urinary functions much disordered, the urine being scanty, or severe strangury supervening, and the testes being drawn up close to the abdominal ring during the tormina. In these instances, the motions soon pass from a mucous or gelatinous state, with streaks of florid blood, to watery, serous, or ichorous discharges, in which float patches of coagulable lymph, or even large shreds, thrown off from the acutely inflamed surface, with copious discharges of blood, mixed more or less intimately with the other matters evacuated from the bowels. Attending these severe attacks, flatulency, nausea, and vomiting of bilious matters, are often present, and continue throughout the disease in many of the fatal cases.

In the simple dysentery, the quantity of fluid matter discharged from the bowels varies very remarkably. In the less severe attacks, the evacuations may not be more than ten or twelve in the twenty-four hours, and these very scanty. As the disease is more acute, or increases in violence during its progress, the calls to stool are more frequent, from twenty, thirty, or forty efforts being made in the night and day; many of them without any further discharge than a small quantity of blood and mucus, and some of them more copious, consisting of watery or serous matters, with dissolved or broken-down fæces, slime, mucus, and blood; the quantity of fluid matters thus voided in the twenty-four hours being very great, and tending rapidly to exhaust and emaciate the system.

This watery state of the evacuations, especially when appearing early in the disease, is indicative of the lodgment of acrid matters in the bowels, which require to be removed by purgatives at the commencement of the attack, or as early as the patient comes under treatment: but, in general, mucous stools are first voided in consequence of the irritation of acrid matters in the colon, and subsequently the watery discharges, the latter being the advanced effect

of the same cause acting upon the irritated, inflamed, and, at last, ulcerated bowel.

In some cases, the disease seems to commence in the rectum; the patient for several days complaining of little more than severe straining, and of passing mucous stools, streaked with blood. If treated judiciously at this period, the complaint very frequently subsides in a comparatively short space of time; but if it be neglected, inflammatory action seems to extend first to the sigmoid flexure of the colon, and successively along the interior surface of this bowel to the cæcum itself, as may be traced by the progress of the symptoms; the seat and extension of the pain, the tormina, the increased frequency of the calls to stool, the abdominal tension, and the attendant fever, being the chief indications of the extension of the disease.

When the simple dysentery commences in the colon, more especially if the whole of this viscus, with the cæcum and rectum, be nearly simultaneously affected, the symptoms are of remarkable severity, and the febrile action induced throughout the system proportionally great, particularly in those who have recently arrived in a warm climate, or who are of a plethoric habit. In many cases, the simple dysentery evidently commences in the mucous surface of the cæcum; the patient complaining from the beginning of disorder, or even before the stools have assumed the dysenteric character, of fixed pain, uneasiness, and fulness in the region of the cæcum. This is most remarkably the case when the disease supervenes to accumulations in the bowels, particularly in this viscus. In this class of cases, the progress of disease along the course of the colon, when the patient comes early for treatment, can readily be traced. To the soreness and pain complained of in the region of the cæcum, with foul tongue, frequent stools, of a watery, feculent, offensive, and otherwise morbid kind, rapidly supervenes pain in the right side, proceeding in the direction of the colon, with tormina, tension of the abdomen, and nausea, or even vomiting, followed by scanty mucous, or watery evacuations, with slime and some dissolved or broken-down fæces. These are soon succeeded by straining, mucous, gelatinous and bloody motions, increase of fever, with more frequent calls to stool, a fouler and more excited tongue, and aggravation of all the symptoms. In the more advanced stages, the tongue is dry, and sometimes encrusted with a brown fur; the thirst becomes urgent; the febrile symptoms greatly increased, particularly in the young and plethoric; and the soreness or pain of the abdomen more fixed, and the tormina more distressing.

Such is the most frequent progress of the simple acute dysentery, until it assumes the most unfavourable appearances in its far-advanced stage. But up to this period the symptoms vary very considerably, according to the nature and severity of the causes whence the disease proceeds; the state of system and habits of the individual; the presence of fæcal accumulations in the bowels; the age of the patient; the length of residence he has passed in a warm climate; and the extent to which the diseased action has proceeded in the alimentary canal, particularly in the large bowels, when he comes under treatment.

In those who have resided for a considerable time in India, or who are of a spare habit of body and phlegmatic temperament, the states of the pulse, of the skin, and tongue, often indicate but little constitutional disturbance early in the disease; whilst in the young, plethoric, and more recent comers, febrile symptoms are nearly coeval with the first appearance of the dysenteric affection of the bowels. At first, the thirst is moderate, but it generally increases during the progress of the disease, and is generally urgent when the fever is high.

When the disease is not severe, and the patient does not complain of much nausea, the appetite is scarcely impaired. Indeed, in many cases, the inflammatory action of the mucous coat of the bowel has evidently proceeded to ulceration, and yet the appetite has not been much diminished. When, however, the stomach can receive food, or stimulating matters of any kind, the large bowels are immediately excited to increased action, and the patient has often an immediate call to stool. The state of the tongue is also various in different cases, evidently owing to the extent to which the rest of the alimentary canal sympathises with the seat of disease, and the degree of disorder existing in the hepatic functions. In the form of dysentery attended with disease of the liver, the tongue is always remarkably affected; but in the uncomplicated disease, it is not so much disordered, being generally, however, white, loaded, and excited, in the early stages of the malady, but becoming dry, encrusted in the centre with a dark fur, and red at the point and edges, as the disease increases in severity, and advances to its last and most dangerous stage. When the biliary secretion is free and copious, the tongue, towards the root and centre, is generally coated with a yellowish fur; and if this secretion be retained in the gall-bladder or alimentary canal, it is generally encrusted with a brown coating in the same situations.

The state of the abdomen is also very different in different cases.

In some, tension, with fulness, proceeding generally from fæcal accumulations, and flatus generated in the bowels, is much complained of; in others, the abdomen is apparently of its natural size. In many cases, particularly in the young and plethoric, much soreness or pain is felt in the abdomen, fixed more particularly in one place, generally in the situation of the cæcum, or in the hypogastric region, with tormina preceding each alvine discharge, from the commencement of the disease. In some instances, the pain can be traced, in the direction of the colon, from the cæcum to the sigmoid flexure; whilst in others, the patient admits the existence of little or no pain, or even soreness, and bears firm pressure on the abdomen without evincing any uneasiness; and yet, upon examination after death, the morbid appearances will be as acute and as extensive, in respect of the inner surface of the bowel at least, as in those cases where the greatest pain was complained of; the only difference being in the more complete limitation of the disease to the mucous surface, in those cases where no pain or remarkable uneasiness was felt.

I have generally remarked, that when the patient has complained much of abdominal fulness, pain, and tenderness of the abdomen to the touch, with great irritability of the stomach, the inflammatory action had extended to the omentum; and that not only this part, but also the peritoneal surface of the colon, had become inflamed, and adhesions taken place between it and adjoining parts. I have often observed also, in cases of this description, a preternatural heat of the abdomen, either in conjunction with these signs, or previous to their supervention.

The tormina and tenesmus also vary in severity. In some cases, neither the one nor the other is very prominently present; but in all the more severe instances of the disease, they constitute the most distressing symptoms. The tormina evidently depend upon the extent to which the disorder affects the muscular coats of the large bowels, and induces irregular and spasmodic action of their fibres, with altered sensibility of the nerves supplying them. The tenesmus evidently proceeds from the irritation of the morbid matters passing along the excoriated and inflamed rectum, occasioning a burning sensation in this viscus, and exciting a spasmodic action of the sphincter ani and circular fibres of the bowel, precluding the discharge of the retained matters, and opposing the violent action of the parts above. When this symptom is present, either dysuria or complete stranguria is frequently also complained of.

The tormina and tenesmus are very much increased, if they be

not in some cases induced, conjointly with the operation of other causes, by the flow of acrid, green, inspissated bile from the liver and gall-bladder, especially when accumulations of this secretion have been suddenly poured into the alimentary canal. This is however, more remarkably the case in the hepatic variety of dysentery. But in many cases of the simple dysentery, the more than usual flow of bile, or even a slight vitiation of this fluid, aggravates in a very marked manner the painful symptoms, and increases the calls to stool. The more copious discharge of bile into the bowels is also promoted by the purgatives necessarily exhibited in the course of the disease, and by the vomitings which occasionally supervene.

Besides the appearances of the stools already pointed out, there are others which are less constant, and which deserve notice. The evacuations are sometimes of a singularly variegated hue, consisting of a glairy mucus, mixed with a greenish, gelatinous substance, sometimes with pure bile, at other times with a muco-purulent matter, with large pieces of albuminous-like concretions formed upon the internal surface of the bowel and afterwards detached, and either with streaks of fluid blood, or with dark coagula, more or less intimately mixed with the other matters discharged. Blood is occasionally evacuated in very large quantities, fluid, and distinct from the other matters composing the evacuation: it then flows from the lower parts of the large bowels. When consisting of coagula, and of dark, grumous clots intimately mixed with the discharges, it may be considered as having proceeded from the upper parts of the colon, or from the cæcum itself. The discharge of pure blood sometimes takes place early in the disease, and continues to its termination in death; but this intestinal hæmorrhage is seldom of a florid hue: it most frequently presents the venous character, and occasionally a dark-brown, muddy appearance, mixed intimately with watery, feculent, and offensive dejections. The copious sanguineous discharge may or may not proceed from an ulcerated surface. I believe that it most frequently exudes from the irritated mucous surface, and that the latter description of discharge is characteristic of ulceration, and occurs most frequently in persons who have neglected the state of their bowels, or who have indulged in the intoxicating liquors of India.

Occasioually considerable quantities of broken-down or semi-dissolved fæces are mixed up with the evacuations described above; but solid fæces, or scybala, are seldom remarked in the dysentery of India, although they sometimes occur. This is owing to the

liquefaction of the retained fæces by the serous fluid exhaled from the irritated and inflamed surfaces with which they are in contact, the accumulated matters forming the fæcal mass being thus washed away by the copious discharge proceeding from the internal surface of the diseased bowels, and, as it were, squeezed in a liquid form, through the spasmodically constricted canal.

The evacuations early in the disease are sometimes very offensive; at other times, and indeed most frequently, they are not very manifestly so. They are occasionally highly bilious, presenting a dark-green, or bright-green and gelatinous hue: they are often greenish-brown, and contain clots of slightly inspissated bile. When the motions present these appearances, the tormina and tenesmus are often urgent, and the patient complains of scalding at the anus, of dysuria or stranguria, and of excoriations about the anus, and not unfrequently of very troublesome and extensive *procidentia ani*. As the malady increases, the alvine dejections frequently become very fetid and offensive; and occasionally have a cadaverous odour towards the latter stages of the most unfavourable cases. This is more remarkably the case when the mucous surface of parts of the bowel is detached from the subjacent tissue, owing to the extension of the inflammatory action to the adjoining coats of the bowel. When such extension takes place in the advanced stage of the most severe cases, as it often does, large pieces of organised membrane are seen in the stools; and I have even observed them hanging from the rectum,—efforts to remove them occasioning a remarkable increase of suffering. The practitioner should not, however, consider every membranous-like substance observed in the alvine evacuations as being a portion of the mucous coat of the bowel. These substances are most frequently exudations of coagulated lymph thrown out upon the inflamed surface, having assumed in some cases the form of the parts on which they had been moulded, and afterwards detached in the progress of the disease.

When portions of the mucous surface are actually detached, they are generally of considerable size, and present a sloughy appearance, quite different from the albuminous exudations which are more frequently observed in the dysenteric evacuations, and which are commonly remarked at a more early period of the disease,—sloughing of the villous coat taking place at a later stage. When dysentery has advanced to its most unfavourable period, the motions are occasionally streaked with a purulent-like sanies, or with an opaque, whitish-grey matter, evidently proceeding from the ulcerations in the mucous coat of the bowel. Towards the close of the

disease, the evacuations are involuntary, owing to the exhausted or paralytic state of the sphincter ani; and the anus and parts adjoining becoming livid, relaxed, and widely open.

When the disease commences with much febrile action, the pulse, which at first was full and strong, becomes, generally in the space of two or three days, small and soft, the accompanying fever passing from an inflammatory to a typhoid type, with great depression of the spirits. This is most frequently observed, and takes place rapidly, in the natives of India, and in those who have been debilitated by a long residence in the country; and seems to be owing to the exhaustion necessarily arising from the frequent fluid evacuations, from the severity of the tormina, the want of rest, the febrile irritation of the system, and rarely from the quantity of blood discharged through the early stages of the malady. When this low or typhoid form of disease is present, the surface of the body often seems shrunk, the superficial veins deprived of blood, and the skin, particularly of the extremities, frequently moistened with a cold colliquative sweat.

In some cases of the simple acute dysentery the skin becomes slightly jaundiced, or assumes a sallow or dusky hue; and this appearance may be independent of any actual disease about the biliary apparatus, arising entirely, in this form of dysentery, from the absorption of the bile, and fluid excrementitious matters lodged and retained in the alimentary canal.

During the progress of the more severe cases, the patient often complains of pains darting through various parts of the body, and is not unfrequently affected with spasms of the muscles of the lower extremities, with irregular contractions of various voluntary muscles, with syncope or leipothymia when assuming the erect posture, imperfect vision, stupor, and other nervous symptoms, depending upon the intimate connexion subsisting between the bowels and other parts of the body.

It should always be remembered that the mildest attack of the disease may become suddenly aggravated; and that exhaustion of the energies of the system may rapidly supervene, even when least expected; frequently in consequence of the extension of the disease along the mucous surface of the bowels, or through their external coats to adjoining parts, and of the severity of the accompanying fever. Sometimes the inflammatory action in the internal surface runs very rapidly into ulceration, or even sphacelation, through the greater part or even the whole extent of the colon, producing great sinking of the powers of life; a fetid exhalation or a

putrid cadaverous smell issuing from the body for two or three days previous to dissolution.

When vascular depletions are prescribed early in the disease, the loss of blood by stool is seldom great. It is chiefly in cases which have not been treated by sufficiently early depletion, or where it has been entirely omitted, and in those patients who have allowed the disease to proceed for several days before submitting themselves to treatment, that considerable hæmorrhage is observed in the evacuations. Such hæmorrhage tends much more to exhaust the system than blood-letting; and the fact of the latter tending to diminish the former, whilst it subdues the disease, should be remembered by the practitioner.

In those cases in which the treatment has failed of arresting the progress of disease, or which have been neglected at a time when medical assistance might have been serviceable, various symptoms supervene, in addition to those already stated, owing to the extension of disorder to the more external coats of the large bowels, to the omentum and other important parts. The patient complains, especially towards the fatal close of the malady, of great increase of pain, distressing anxiety, restlessness, inability to sleep, frequent vomiting, and copious discharges *per anum* of morbid secretions and fæcal matter, which had been retained whilst the spasmodic action of the muscular coats of the bowels remained in full force. To these are soon added hiccup, cold sweats, a cadaverous odour exhaled from the body, cold extremities, sunk countenance, delirium, floccitation, jactitation, remarkable smallness and sinking of the pulse, insensibility, and death.

The disease, as now described, may run its course in three, four, or five days, or it may continue as many weeks. When it lasts as long as the latter period, it is chiefly owing to its having assumed a sub-acute form at the commencement, or to a partial reduction of its violence by treatment. If left to its course, it generally terminates fatally in a few days.

Having thus attempted to describe the usual progress of the disease, with the modifications which it most frequently presents, I shall next point out the symptoms indicating the different *terminations* to which it is subject, in order to enable the practitioner to form an accurate *prognosis* of its issue.

When the symptoms are mild, or when severe, if they yield under treatment, then a *favourable termination* may be looked for, especially if the stools become less frequent, but more copious and feculent, and otherwise more natural; if the abdominal pain

and the tormina preceding them disappear, or are less severe, if the tenesmus abates; if the frequency of the calls to stool, particularly in the night, diminishes, and the patient enjoys some repose; and if the general febrile and painful symptoms are alleviated.

If, *on the other hand*, the above signs become aggravated in severity, or even if we make no advance upon disease; if the frequent watery discharges and loss of blood from the bowels seem to sink the powers of life; if nervous symptoms, such as cramps in the lower extremities, leipothymia, subsultus tendinum, catchings, floccitation, irregular action of the voluntary muscles, stupor, hiccup, delirium, &c. supervene; if the surface of the body is shrunk, cold, or covered with colliquative sweats; if the countenance becomes hippocratic and anxious, and the extremities cold; if the pain in the abdomen increases rapidly and becomes fixed, with great fulness, preternatural heat, and tenderness to the touch; if paralysis of the sphincter ani takes place, or paralysis of more distant parts, as of the tongue, muscles of the face, &c.; if loss of sight or of hearing is observed; if the evacuations become grumous, mixed with small dark coagula and light muco-purulent streaks, and particularly if they contain sphacelated portions of the villous coat of the bowel; if the stomach is so irritable as to reject whatever is taken; if complete strangury or suppression of urine is remarked; and, in short, if any of the symptoms already mentioned in the history of the disease as characterising its fatal close supervenes, we may consider that the vascular disorder of the vessels of the large bowels has produced that extent of structural change, which, with the sympathetic disorder taking place in other organs, is almost beyond the reach of art, and which, with but few exceptions, will soon destroy life.

When *gangrene* supervenes, as a termination of the most severe cases of dysentery, it is not often complete, the internal surface only of a part of the bowel being sphacelated, and detached from the adjoining parts, or hanging loose in the canal; whilst the external coats are somewhat altered in colour, much softened, and readily torn. This state may be with greater justice called partial sphacelation of the bowel, than that of complete gangrene, which is seldom remarked when the dissection takes place within two or three hours after death; but which is not unfrequently observed when the examination of the body is delayed even for a few hours.

The symptoms indicating the supervention of this termination are the phenomena just now detailed, followed by leipothymia, hiccup, a sudden remission of the tormina and abdominal pain; cold, shrunk,

and bedewed countenance and extremities; sense of coldness in the abdomen; involuntary motions; lividity of the lips and cheeks; glassy state of the eyes; convulsions; great prostration of strength; cadaverous smell from the body; great fetor of the evacuations; and coma, or complete insensibility.

The simple acute dysentery may also terminate in a chronic form of disease; and it may induce disease of the liver or of the mesenteric glands. When, however, either of these affections supervenes to this form of dysentery, a most chronic and obstinate complication is the result.

Ulceration may take place early in the disease, even in its mildest forms, in appearance, without betraying any decided indication of its presence. Most frequently, however, the symptoms become aggravated: the stools are generally changed from a slimy, gelatinous state, with distinct streaks of blood, to a serous, muddy, and grumous condition. The blood in the evacuations is of a darker colour, and often mixed either with an ichorous sanies or with purulent-like streaks. The stools are often also of a muddy, dark-brown, and watery appearance, having the odour and appearance of the washings of raw meat. When, however, the ulceration is low down in the colon, or in the rectum, the blood discharged is often distinct from the rest of the motion, and of a less dark colour. In many cases wherein the mucous surface of the bowel only is inflamed, ulceration may proceed without being suspected by the practitioner, especially during its earlier stages. As it advances, however, through the coats of the bowel, the patient generally complains of pain in the course of the colon, even although he may have felt none previously. When the blood is observed in the evacuations in very large quantity, unmixed with the rest of the dejection, and not in numerous streaks, we should suspect the existence of one or more large ulcerations low in the canal. But if the mucous, gelatinous, or slimy stools are merely streaked with blood, we should consider this appearance as an exudation of this fluid from the inflamed or excoriated capillaries supplying the mucous surface, without any sensible rupture or solution of continuity in the part affected.

SECT. II.—*On Hepatic Dysentery.*

This is a form of dysentery of remarkably frequent occurrence in India. Its nature and treatment, therefore, become a matter of the greatest moment, especially as the complication constituting this

particular variety of disease renders it one of very difficult management. Hepatic dysentery assumes various forms or modifications: it is sometimes acute, but much more frequently sub-acute and chronic. The more acute forms of the disease are generally accompanied with an acute affection of the liver, and a very morbid state of the biliary secretion; and the chronic states with abscess, collections of purulent matter, and other organic changes in the substance of this viscus.

It would, perhaps, be one step towards the establishment of a rational mode of treatment in this very destructive form of dysentery, if the nature of the connection subsisting between the affection of the bowels and that of the liver were clearly ascertained, and the manner in which the one supervenes to the other were closely observed. These points, however, present great difficulty, especially as they do not frequently admit of satisfactory proof, although the mind may often form a tolerably just inference on the subject, from contemplating the nature and succession of the morbid phenomena presented to it in particular cases. These topics require the attention of the reader, and particularly the practitioner in the eastern hemisphere, as they distinctly point out the importance of a very early employment of the most decided means of cure within our reach, which can only be advantageously prescribed by a previous recognition of the nature of the morbid actions that are to be removed. Disease, in India, runs its course with such rapidity that unless it be restrained by judicious treatment, in ten or twelve hours from its commencement, in nine cases out of ten, the patient will be lost, or that effect produced on the constitution which will render a soldier unfit for active duty. To this is to be attributed the discharge of so many men after the short period of two or three years' service.

The great advantage resulting from knowledge and decision on the part of the practitioner will be manifest to every one acquainted with intertropical practice. By observing the nature and extent of disease accurately at its commencement, especially in respect of the particular form of disease now about to be considered, it is more readily removed, even before those complications which it may form in a few hours if not interfered with have supervened, and before the diseased organ has become seriously injured either in its functions or structure. In practice, however, amongst the European soldiery in India, disease is often fully formed before it comes under the observation of the practitioner. To prevent this very untoward circumstance is by no means easy, or even practicable, in some

instances, however important it may be, and undoubtedly is, to the government, as well as interesting to humanity, inasmuch as it is generally beyond the influence of the medical officer. It is an evil which has its origin in the habits of this particular class of the community, and which, in many instances, admits of removal only through an improvement of these habits. But much may be done to remedy it, particularly by those who are in command; and how far this may be accomplished by the authority of those, and the science of the medical practitioner, I consider it my duty fully to point out. As, however, this is a subject which regards other diseases of warm climates, as well as that now under consideration, I shall reserve the observations I have to offer respecting it, to the conclusion of this work, especially as it involves matters of the first importance to the welfare of the Indian army, and of European troops serving in warm countries generally.

Dysentery, when complicated with disease of the liver, admits of more than one explanation as to the nature of the connexion; and this is of two kinds: the dysenteric affection in the first variety appears to be altogether a symptom either of a morbid secretion of bile, or of the advanced stage of structural disease of the liver, generally of its internal texture; in the second variety, the hepatic disease seems to be induced by the disorder of the bowels, more particularly when this disorder is of a sub-acute or chronic kind, and to proceed, when thus excited, conjointly with it either to a favourable or unfavourable termination. Although the diseases of the liver and bowels, in the majority of instances, thus supervene the one to the other, and become co-existent, yet I will not deny that they may be in some cases nearly co-eval as respects their origin, or at least so very nearly simultaneous in their attack, that the priority of lesion can scarcely be detected.

In those cases, however, where, owing to the state of predisposition in which the bowels and biliary organs may be at the time, and to the nature of the exciting causes, disease is nearly simultaneously produced in these viscera, it will generally be found, upon closely analysing the phenomena, that the disordered function of the liver is remarkably efficient in producing the dysenteric affection; and that a morbid state of the biliary secretion is evident at its commencement, even although the liver may betray no other symptom of serious derangement at this period of disease.

In hepatic dysentery, therefore, we may consider the relation of morbid action as being chiefly of two kinds: *first*, that in which the dysenteric symptoms are produced by functional or organic dis-

ease of the liver; and *secondly*, that in which the diseased actions of the liver are excited by the dysenteric disease. When the complication is once induced, the one disorder tends to perpetuate the other, and to render each much more difficult of cure, and, consequently, much more dangerous, than their simple form of existence.

The simple form of dysentery is an acute and inflammatory disease among Europeans residing in warm climates, frequently induced, or at least promoted, by accumulations of morbid secretions and fæcal matters in the large bowels. The same characteristics are also, in some degree, applicable to hepatic dysentery; for it may be, and indeed generally is, attended with an inflammatory state of the mucous surface of the bowels, varying in degree in particular cases, and sometimes with collections of morbid matters in the *prima via*. This is particularly the case when the dysenteric disease either precedes, or is nearly coeval with, the hepatic affection. When the disease of the liver, and the morbid secretion of bile resulting therefrom, induce the dysentery, an inflammatory condition cannot so unequivocally be assigned to the mucous surface of the large bowels, in the early stages of the disease especially, although such condition undoubtedly supervenes sooner or later, according to the particular states of the viscera previous to the attack of disorder, and the various circumstances connected with the individual. In cases of this description, the morbid secretion proceeding from the diseased liver seems to irritate the mucous and muscular tunics of the bowels, to excite the extreme vessels on their internal surface to an increased and morbid exhalation and secretion; and, lastly, to excoriate and inflame these viscera. It is owing chiefly to this effect of the acrid secretions poured out by the liver, that the mucous surface of the small intestines is generally found diseased in fatal cases of hepatic dysentery, although in a less degree than that covering the large bowels,—as I shall have to show when describing the appearances observed upon the examinations after death from this malady.

Dysentery, when it thus supervenes to hepatic disease, may be considered in its early stages as altogether depending upon it, and removable with it, although more frequently assuming a chronic state, in consequence of circumstances presently to be considered. But as soon as the secondary affection has gone on to ulceration, it may be looked upon as an independent disease, tending quickly to the destruction of life, and having this tendency farther enhanced

by the original malady, and the morbid secretions proceeding from the organ in which it is seated.

When dysentery supervenes to functional or organic disease of the liver, and becomes complicated with it, the hepatic symptoms are very frequently masked by the more urgent and violent phenomena characterising the bowel complaint; so that if the connexion be not looked for, it will often escape observation. Sometimes the affection of the liver has been evident for several days previous to the appearance of bowel disorder, and at other times the dysenteric complaint supervenes to repeated or long-continued disease of the liver: in such cases the connexion is more manifest; and in several instances, the dysenteric disorder must be viewed as being merely a symptom of that particular termination of hepatitis.

In many other instances of this complication of disease, particularly when the disorders of both viscera are very nearly coeval, the inexperienced observer may not detect the presence of biliary derangement until the disease is hastening to a fatal termination, and unequivocal signs of abscess are present. In cases of this description, the violence of the dysenteric symptoms absorbs the whole attention of both patient and practitioner, and the complication is overlooked. But the more inexperienced will often readily detect, even at the commencement of disorder, or at any of its more advanced periods, the real extent of disease; and will, even in the more insidious and difficult cases, from the state of the evacuations, and a careful examination of the patient, generally form a tolerably correct opinion respecting its nature, tendency, and complications.

In many cases, also, I have had occasion to observe, that well-marked disorder of the liver has been present for a considerable time, that dysenteric symptoms have supervened, and that the signs of diseased liver have entirely disappeared upon the supervention of the bowel complaint. This is a circumstance which may mislead the inexperienced observer of intertropical diseases; but the experienced practitioner will seldom be so misled; he will not conclude that, because the prominent symptoms of hepatic disease may have disappeared, such disease does not exist; he will still dread its presence, will act as if it did exist, and will even succeed at last to detect it, amid the obscurity which for a time veiled it from his view; yet it seems to me too generally supposed by pathological writers, that the morbid changes detected in the liver in deaths from dysentery have been present not only from the commencement of the dysenteric symptoms, but have actually caused them, although the affection

of the liver, and the morbid state of its secretion, had escaped the detection of the practitioner. This inference I hesitate not to consider as entirely unwarranted, both by the symptoms characterising the early stages of the disease, and the manner in which morbid actions may be induced in organs so intimately related as are the liver and bowels.

The view which I am disposed to take of the subject is this: irritation induced in the mucous surface of the large bowels, so as to become productive of increased action of the alimentary tube, elicits a greater determination and quicker circulation of the blood in the vessels supplying this part of the economy, and, consequently, an increased flow of blood in the portal vessels of the liver is thus occasioned. If, at the time when this effect is produced, the liver be either in a state of simple congestion, or accumulations of bile in the biliary ducts and gall-bladder, an increased flow, generally of acrid or otherwise morbid bile, is thereby produced, and, on some occasions, even inflammation of the substance of the organ supervenes. But even when neither congestion nor morbid accumulations of bile are present, thus predisposing to inflammatory disorder of the liver, and heightening the affection of the bowels, the increased flow of blood in the portal vessels, necessarily proceeding from the determination to the alimentary tube, will tend to cause an augmented secretion of bile, which may also be possessed of acrid properties, and further increase the original disorder of the mucous surface of the large bowels.

It seems also by no means improbable that the accumulations of fæcal materials in the bowels, which so frequently are productive of the simple form of dysentery, tend occasionally to vitiate the mass of blood conveyed into the *vena portæ*, and in this manner to favour the supervention of a morbid state of the biliary secretion and of the liver itself. During the retention of excrementitious matters in the *prima via*, a part of them most probably is absorbed, carried into the mesenteric veins, and must consequently circulate through the liver, furnishing the materials for a morbid state of the bile, and being also causes of irritation to the secreting texture of the organ. Hence may arise either disordered function or structural disease; and even occasionally both, which will aggravate the inflammatory affection of the large bowels, and even promote the extension of disease along the whole intestinal mucous surface.

Whether inflammatory irritation may be propagated along the mucous surface of the alimentary canal, and the common and hepatic ducts, to the liver itself, I shall not pretend to decide. That such

extension of disease is not impossible, may be granted; but to infer that it actually takes place, and that the instances of diseased liver supervening to dysentery are generally owing to the propagation of inflammatory action in this particular way, is an inference which cannot be supported by what is usually observed in *post mortem* examinations of this disease.

Considering, therefore, that hepatic disorder supervening to dysentery, and becoming complicated with it, is generally induced in the manner now pointed out, the necessity of not only watching for the supervention of this complication, but also for the adoption, early in the dysenteric disease, of those measures which shall most effectually prevent it, must be apparent to every one.

During the progress not only of dysentery but also of hepatitis, it will occasionally be observed, that the one affection supervenes to the other, disappears for awhile, and then returns. Thus, during hepatitis, dysentery will sometimes take place, disappear after two or three days, the hepatic disease becoming more acute, and again return in an aggravated form. In such instances the dysenteric affection must be considered as entirely symptomatic. Thus, also, during the progress of dysentery, hepatic disease sometimes evinces itself,—the dysenteric disorder either becoming somewhat alleviated or being for a time altogether removed, but afterwards returning and accompanying the hepatic disease to its termination. Such cases can only be viewed as complications of the affections under consideration; disorder of the one organ inducing that of the other, and, when thus induced, being somewhat modified in character by the secondary affection. But it very seldom happens that the one disease is removed, or even much alleviated, upon the supervention of the other; on the contrary, the increased violence of the one rather absorbs the sensibility of the system, abstracts it from those parts where it is naturally in a less degree, and where its morbid excitement is less, and thus renders disease existing elsewhere, particularly when not so severe, and seated in a less sensible organ, much more difficult of detection by the practitioner.

On many occasions, also, practitioners will find in warm climates, and particularly in India, that during convalescence, either from dysentery or from hepatitis in their simple forms, exposure to any of the exciting causes of those maladies will produce one of three consequences;—either a return of the original disease, or an attack of a disorder intimately allied to it, or both. Thus, if, during convalescence from hepatitis, the patient be exposed to the night air, or is imprudent in his diet and regimen, he will either experience a

relapse of the hepatic affection, or be seized with dysentery; or, in addition to a return of the liver complaint, dysentery may be induced, and both disorders proceed *pari passu*, each tending to aggravate the other. The same observation equally applies to convalescence from dysentery, hepatitis being frequently produced in a similar manner, and appearing either alone or conjointly with a return of the dysenteric disease.

In many of the more chronic cases of hepatic dysentery, the bowel affection supervenes as a symptom of the morbid functions and organic changes of the liver consequent upon active disease. This result is most frequently observed to follow upon the organic changes of the liver already described. But, independently of being connected with those more remarkable structural changes, the dysenteric affection, especially in its more chronic states, is frequently conjoined with a torpid state of the hepatic functions, with an impaired and morbid secretion of bile, and with a more or less complete obstruction of this function. In short, it may be said of dysentery complicated with hepatic disease, that the dysenteric affection is found related to every form of disorder of the liver which has passed in review, whether functional or structural; and that the more acute states of dysentery are generally connected with the more active affections of the liver, and the chronic affections of the bowels with organic changes of this organ, and an impaired, vitiated, or obstructed secretion of bile.

In those cases of chronic dysentery where the secretion of bile is much impaired or entirely obstructed, the process of chylification is very imperfectly performed, and the alimentary matters, during their passage through the bowels, enter into combinations of an irritating nature, and, during their remora in the large bowels, occasion a morbid excitation of these viscera.

Dysentery supervening to disease of the liver constitutes the *first* form of complication. In cases of this description the extent of disease is generally apparent, unless the primary affection of the liver, in which the dysenteric disorder originates, escapes the attention of the practitioner, or the patient has delayed to resort to medical aid before the bowel affection has taken place. In order, however, to ascertain this point, the medical man should inquire into the history of the case, and should look particularly for those signs which are characteristic of the different forms of inflammation of the internal structure of the liver: having ascertained the presence or absence of these, the nature of the disorder will be evident.

In the *second* form of complication, viz. when the affection of

the liver supervenes to dysentery, the affection of the bowels has generally been of a longer or shorter standing, and has commenced in the same manner as in the early stages of the simple dysentery: for as hepatic dysentery is nothing else than the complication of disease of the liver with disease of the bowels, the symptoms marking this complication cannot exist until both organs become affected. But as this association of morbid action is very frequent, the appearance of dysenteric symptoms should lead the practitioner to inquire attentively after the disorder of the hepatic organs; and, if this disorder be not present, to prevent its supervention by the early employment of decided measures, and to watch for those signs which indicate its supervention.

When the complication of disease constituting hepatic dysentery takes place in a more immediate manner, or, in other words, when the affection of both organs is nearly coeval, many of the symptoms described as characterising inflammation of the substance of the liver, will generally be observed, in addition to those already mentioned as pathognomonic of simple dysentery. In some cases, however, the hepatic disorder is very difficult of detection; and of the many signs by which it is characterised, but few perhaps may be present, and these may not always be such as can implicitly be relied upon. The observations already offered on the history of inflammation of the liver, if attentively studied, will assist in detecting the particular complication of disease now under consideration; and to these I must refer the reader, as introductory to a clear conception of the present subject.

In many cases of hepatic as well as of simple dysentery, the patient presents for a day or two, many of the symptoms particularised in the section on the premonitory signs of disease; but this is not uniformly the case. The countenance is often pale, the skin cold with horripilation, sickness, and loss of appetite, and a disordered, costive, and irritative state of the bowels. The patient often, at the same time, complains of a sense of chilliness, coldness or uneasiness in the back and lumbar region, running down the sacrum, sometimes as far as the anus, with griping pains through the abdomen. These symptoms, however, seldom fall under the observation of the practitioner, unless he makes it a duty to inquire particularly into the condition of the men under his charge during health; for it is not generally until the phenomena pathognomonic of simple or complicated dysentery are fully developed, that medical advice is sought after. In those cases of hepatic dysentery in which the complication is immediate, or disease nearly coeval in both

organs, the premonitory signs now noticed are often well marked, the griping pains extend through the abdomen and hypochondria, and are sometimes attended with vomiting, a sense of fulness and oppression at the præcordia, lowness of spirits, and slight dyspnœa.

At the commencement of this particular form of the disease, and generally following the above symptoms, the alvine dejections become frequent, and at first are usually copious, but morbid, both in colour, consistence, and odour. At this period they are very seldom either mucous or bloody, but they are generally very dark, crude, and offensive. As the disease advances, they vary daily, but are generally green, bottle-green, greenish brown or black, mixed with venous blood; sometimes slimy and watery, with a greenish frothy slime on the surface; rarely clay-coloured, and not unfrequently, especially in the advanced stage of the worst cases, reddish brown, ochre-like, or consisting chiefly of water, with blood more or less intimately diffused through it. The motions vary in frequency and in character, according to the stage of the disease and the treatment adopted. There is generally urgent tenesmus present, with scalding of the anus, and often *prolapsus ani*. The calls to stool are more frequent during the night, and attended with more or less irritative fever and restlessness. Sometimes the blood is so very intimately mixed with the other matters forming the alvine evacuations, that it must have proceeded either from the superior portions of the alimentary canal, or from the liver itself. But this is an appearance observed chiefly in the far advanced stage of the disease, when also the evacuations often resemble the washings of raw meat, and present nearly similar characters to those marking the last period of the simple form of the disease. The urine is generally in very small quantity, high-coloured, muddy, and evacuated usually with pain and difficulty.

In addition to this state of the alvine excretions, the patient generally complains of a fixed pain, weight or uneasiness, in the pit of the stomach, increased on pressure, and frequently extending to the right hypochondrium, and beneath the right scapula. There are usually also present tension, and a sense of pressure at the hypochondrium, with anxiety at the præcordia, fits of dyspnœa, occasionally pain in the right shoulder, or in the chest, with a dry, teasing cough, headach, giddiness, sickness at stomach, sometimes vomiting, and great depression of spirits. The pulse is generally accelerated and irritable, especially towards night.

The appearance of the tongue is various in different stages of the disease, and in different cases: in the early stages it is generally

white, excited, and covered with a yellowish fur. As the disease advances, the tongue either becomes dry, clean, smooth, red, and lobulated, or excited, dry, and covered at the root, particularly with a dark crust. The skin is sometimes dry, harsh, and of a dirty appearance; occasionally it is covered with a greasy perspiration, and copious sweats often occur through the advanced periods of the disease. There are also frequent thirst, and great desire of cold fluids. In other respects, the progress of hepatic dysentery is much the same as the simple form of disease already described; but it presents, in general, a greater range or variety of phenomena in different cases, and even in the same case, in different stages of the malady.

When the dysentery commences in the simple form already noticed, and after continuing in this form for several days at last draws the liver into a state of disease, the symptoms referrible to this viscus are often very obscure. The tongue becomes dry, excited, and sometimes encrusted with a dark fur; the pulse irritable and quick; the patient is very despondent and restless, especially during the night; the stools are continually changing their appearance, being sometimes green, slimy, and streaked with blood; at other times pale, clay-coloured, and yeasty, and, as the disease advances, of an ochrey appearance, or of a reddish-brown colour, as if intimately mixed with blood, which had either passed from the extreme capillaries of the liver, into the biliary ducts, or from the mucous surface of the small intestines. In cases of this description, the functions of the liver are greatly impaired, as well as vitiated, and the vital energy of the organ in a great measure gone.

In hepatic dysentery the pulse is sometimes irregular and even intermitting, and occasionally it betrays but little derangement until evening, when it is sharper and more accelerated. The countenance, besides being expressive of suffering, and extremely anxious, is sometimes apparently deficient in life, and the animal heat below the natural standard. This is particularly observable in second attacks of this form of dysentery, which are always very dangerous. The anxious expression of the countenance is frequently great, when the state of the pulse is but little different from that of health. When this is the case, the appearance of the countenance is more to be confided in, as truly evincing the state of disorder, than the pulse, which, even in the worst cases, often indicates, particularly in respect of frequency, but little danger up to the last stage of existence.

In the more chronic examples of the hepatic dysentery, especially

in those connected with abscess of the liver, the purulent matter not unfrequently finds its way into the alimentary canal, from adhesions of the inflamed surface of the liver to some part of the tube, or through the medium of the ducts. In such cases, the purulent discharge will readily be detected in the evacuations; and this circumstance, with the phenomena relating to it, will farther elucidate the particular nature and extent of disease. Abscess of the liver, however, may discharge itself into the alimentary canal, and yet escape notice, from the intimate admixture of the matter discharged from the abscess with the contents of the bowels rendering the detection of it in the motions more difficult.

The symptoms of the chronic forms of hepatic dysentery are more mild: tormina and tenesmus are not severe, if at all complained of. Little or no pain is felt, even upon pressure, in the course of the colon; but the alvine evacuations are always more or less unnatural, and present appearances either of a morbid state of the bile, or of a deficient or obstructed secretion of this fluid. The calls to stool are also not so frequent as in the acute cases; but there are present great debility, depression of spirits, and sinking of the powers of life, particularly in those who have been addicted to intoxication.

In respect of the symptoms marking the usual *terminations*, or most remarkable organic changes, of the complicated dysentery, I have nothing farther to offer than what has been stated in the previous section, and in the sections on Diseases of the Liver. Hepatic dysentery, besides terminating in a similar manner to simple dysentery, often terminates in abscess of the liver, as well as occasionally originates in it. The phenomena characterising this occurrence have been already detailed; but, when abscess takes place from disease of the substance of the liver, consequent upon dysentery, its supervention is generally obscure, and often escapes detection altogether until the purulent matter is observed in the dejections, or discovered by *post-mortem* examination.

In addition to the different *terminations*, therefore, of the simple dysentery already described, the complicated form of disease, presents also the usual appearances of morbid structure of the liver, especially abscess, and lesions of a chronic kind. The signs characteristic of the terminations of simple dysentery mark the supervention of similar changes in the complicated affection also, and are equally to be confided in as a basis of *prognosis* as to the issue of the disease. In short, the practitioner must deduce his prognosis from his knowledge of the phenomena characteristic of the progress

and terminations both of hepatic disease and of the simple form of dysentery, and from the manner in which the symptoms of the one affection are associated with those of the other. The signs marking the progress and terminations of both affections are already before the reader: it will be his duty to watch them carefully, and to form his opinion from their nature and relations, remembering always that the unfavourable symptoms of the one affection are to be considered as being still more unfavourable if associated with similar phenomena of the other; and more especially if both the series of local signs are attended with urgent symptoms of constitutional disturbance and sinking of the powers of life.

Sect. III.—*On the Causes of Dysentery.*

The consideration already given to the subjects of malaria, of climate, and of diet and regimen, in warm climates, as causes of the most prevalent diseases, renders it superfluous to enter upon them on this occasion further than to point out their very powerful influence in the production of the disease now under consideration. The extent to which dysentery prevails amongst the natives of Europe, particularly European troops, in warm climates, may be inferred from the published abstracts of the official returns, and from the returns given in my "Sketches of the Diseases of India." In all the provinces of the Madras Presidency, dysentery is most prevalent at the commencement, during, and for some time after, the rains; showing the powerful influence of season, and the causes contingent on season, in the production of this disease.

Of dysentery as well as of fevers, it may be confidently stated, that all situations productive of terrestrial emanations, or malaria, and which furnish exhalations from the decay of animal and vegetable productions, under the operation of a moist and hot state of the atmosphere, will always occasion dysentery in the predisposed subject; and that the seasons of an intertropical country, in which a moist state of the air is conjoined with the greatest daily range or sudden vicissitudes of temperature, are those that are generally most conducive to the generation of this disease.

The greater prevalence of dysentery amongst the male than amongst the female sex, has been observed by the majority of writers on this disease, as it occurs in temperate climates. A similar remark may be extended to the dysentery of warm climates. This arises chiefly from the greater and more frequent exposure of males to its exciting causes, and to the partial immunity from

inflammatory affections of the large bowels, resulting from regularity in the periodical discharge of the female. When dysentery attacks this sex, it usually proceeds from morbid accumulations in the bowels,—an occurrence too frequent among females of all classes.

Recent comers to a warm climate are more disposed to dysentery than long residenters, notwithstanding their possession of greater tone of the digestive and assimilating functions, and a sounder state of the liver; and this disposition is heightened in proportion to the youth of the individual. I consider that the period of life extending from sixteen to twenty-one, the epoch of existence at which Europeans, particularly recruits, arrive in India, is that most predisposed to intertropical dysentery; and, consequently, that it is more prevalent at this age than at any other, under the ordinary circumstances of exposure to its exciting causes. Doubtless, much may be imputed to the imprudencies which mark this period of life, but they are not altogether sufficient of themselves to account for the greater prevalence of this malady, under the various circumstances in which it has presented itself at this age, without imputing something to the predisposition possessed by the European constitution to be affected by dysentery, after migration to a warm climate early in life.

The form of dysentery to which new comers to a hot climate are liable, is generally less complicated, more acute, but more manageable, if treated early and decidedly, than the form of disease most frequently attacking older residenters. The former class of the community is more subject to the acute, uncomplicated dysentery; whilst the latter is more liable to the complicated form of disease, more particularly to the complications of dysentery with affections of the liver and with fevers.

Dysentery is more or less an inflammatory disease in almost all cases, and under all circumstances, in which it occurs in warm climates. But there is a very wide range in the nature of the states both of the constitution of the individual and condition of the bowels in which the inflammatory action supervenes. In the recent visitor of a warm climate, or in the robust and healthy, the inflammatory action is characterised by tone, is acute or phlogistic, and supervenes early in the disease, even although it may not be said to originate it. In the weak, debilitated European, or in the native of the country, the inflammatory action is devoid of tone, is more limited to the mucous surface of the bowel, more frequently supervenes to a state of irritation of the bowel from a morbid state of the secretions poured into it, either from the collatitious viscera or from

its own surface, and is more prone to run into ulceration, without evincing acute symptoms, than in the robust and recent visitors of the climate. The disposition to inflammatory disease of the bowels is great amongst this latter class in proportion to the degree in which vascular plethora is present, and to the peculiarity of constitution with which it may be conjoined; and the acuteness of the attack generally depends upon the previous soundness of the frame and tonicity of the animal fibre,—circumstances possessed in the highest degree by those who are recently arrived from Europe, but which gradually disappear before a prolonged residence in an intertropical country.

The same series of changes taking place in the animal economy, from a change of residence from a cold to a warm climate, favouring the production of disorders of the biliary functions, seems also to promote the supervention of disease of the bowels. This latter effect may arise from the morbid condition of the biliary secretion: for it is reasonable to suppose, that an acrid state of the bile will both irritate the mucous surface of the bowels, and imperfectly perform its office of changing the chyme into healthy chyle. The result of this will be, that the imperfectly digested chyme will undergo those changes which its elements are chemically disposed to enter into under the circumstances, particularly as respects temperature and fluidity, in which they are placed; that they will form combinations of an unhealthy and consequently irritating nature, and heighten the morbid effects produced by the disordered state of the bile; and thus one species of disorder will produce another, which, in its turn, will heighten and perpetuate its antecedent, until dysenteric disease is fully developed.

Another powerful predisposing influence in the production of dysentery arises out of the circumstances connected with the passage to a warm climate. During the voyage to India, both soldiers and sailors, the former especially, generally enjoy too rich and stimulating a diet for the circumstances in which they are placed. Amongst sailors, who have the active duties of the voyage to employ them, the resulting evils are not so remarkable as amongst soldiers and passengers; for the duties of the former promote the excerning functions of the body, and prevent vascular fulness and accumulation in the bowels from taking place to so great an extent as amongst the latter. Persons in the voyage to India, soldiers more particularly, are placed, during four or five months, in circumstances the most calculated to generate a liability to disease upon their arrival in that country. The quantity and quality of their

food, their too liberal allowance of spirituous liquors, and the want of exercise during the whole of this period, tend most decidedly to generate a plethoric state of the vascular system, to increase the excitability of the nervous system, to augment the rigidity of the animal fibre, and thereby to give a phlogistic diathesis to the constitution generally. These circumstances thus produce a state of system the most liable to become affected by the prevalent diseases of warm climates generally, particularly fevers, dysentery, and hepatitis, soon after the European has arrived in an intertropical country, and been exposed to the most common exciting causes of these maladies. But there is another circumstance superadded to the above, during the voyage out, tending to heighten their influence, and to occasion the disease now under consideration, more especially its acute and uncomplicated form: I allude to the costive state of the bowels, to which passengers by sea are particularly liable, and the accumulation of fæcal matters which consequently forms in the cæcum and colon, irritating those viscera, or disposing them to irritation as soon as the frame is subjected to the influence of the common exciting causes of the disease. That numerous cases of dysentery originate in this way, and indeed commence very frequently with the characteristic signs of morbid accumulation in the large bowels, has been a matter of daily observation in my practice amongst recruits and persons recently arrived in India. In addition to this also, the season when persons, especially recruits, arrive in India, is frequently that at which the exciting causes of disease are most numerous and energetic; and the circumstances in which they are placed soon after their arrival, are very often highly injurious, and such as directly occasion the disease now under consideration.

Amongst the predisposing causes of dysentery, the most powerful undoubtedly are those states or functional disorders of the large bowels which have been already considered, particularly accumulations of fæcal matters in the colon, and morbid elongations and displacements of parts of this viscus. Indeed, these may sometimes be considered as the precursors of the disease. Disordered function of the liver, attended either with a redundant, a vitiated, or an impeded secretion of bile, also frequently disposes to an attack of dysentery on some occasions, as well as directly excites it in others. It is frequently observed supervening, in the course of or during convalescence, from fevers of every type, especially after those in which the functions of the liver have been seriously deranged. When dysentery takes place during convalescence from fevers, or soon after recovery from them, or when it is consequent upon

affections of the digestive and collatitious viscera, it generally arises from exposure to the night air, to wet and moisture, and from errors in diet and regimen: these causes being, as it were, efficient in the production of the disease, whilst the previous malady had disposed the system to their influence. The inter-tropical practitioner will often have occasion to remark, particularly during his military duties, that when a patient is discharged from hospital at an early stage of convalescence from fever or hepatitis, he returns in a few days, either with a relapse of his former disease, or with dysentery; but most frequently with the latter, especially if attention have not been paid to his comfort in sleeping and to warm clothing, upon his removal from hospital into barracks, during the comparatively cold nights which prevail in some parts of India during the rainy and cold seasons, or if he has indulged in that bane of the European soldier—the intoxicating liquors of the country.

A frequent disposing cause of dysentery among the natives of India is a weakened state of the digestive and assimilating functions, more particularly when this state proceeds from a deficiency of wholesome and nutritive food. Under such circumstances, dysentery generally commences with symptoms of great debility, especially in respect of the functions of the stomach; and if, in addition to this cause, they are exposed to the influence of greater humidity and more noxious terrestrial exhalations than they have been accustomed to, particularly if these causes be conjoined with fatigue and exposure to the night-air, dysentery assumes amongst them an epidemic character, and is attended with a much greater mortality than among Europeans. In the natives of India, also, I have remarked a greater disposition to the disease in those subject to rheumatism; and whilst in them it generally proceeds from the same causes which produce rheumatism, namely, vicissitudes of temperature and of weather, and exposure to cold and wet, it has evidently alternated with this affection on some occasions, and in others supervened immediately upon the disappearance of the rheumatic affection from the extremities or large joints.

The prevalence of worms in the alimentary canal of the natives of India may have some influence in the production of dysenteric attacks; and yet, when we consider the frequent existence of those parasitical animals amongst them, and the comparatively rare occurrence of dysentery, excepting from the circumstances just now alluded to, this can scarcely be considered as a cause of great power. The comparative immunity of the natives from dysentery

seems to be entirely the result of constitution and their modes of living. The functions of the liver and bowels are, under their ordinary circumstances of life, less disposed to disorder, and seldom acted upon by those exciting causes to which Europeans expose themselves. They are also, from the nature of their organisation, less subject to inflammatory affections; whilst acute disease, particularly dysentery, more rapidly exhausts the powers of life, and thus frequently assumes an adynamic or putrid character in the natives of India. This should always be kept in mind, and be made the guide of practice amongst this particular class of the community.

Amongst the numerous *exciting* causes of dysentery to which the European soldier is liable in India, there is none whose influence is so marked as indulgence in the intoxicating liquors of the country. The sick-list of a regiment is invariably increased after pay-day, when the men have the means of this indulgence in their power; and the consequence is generally an attack of dysentery, proceeding commonly from the excitement of the mucous surface of the digestive organs, and the derangement of the biliary and other secreting functions, occasioned by these beverages. When the soldier becomes excited by the use of spirituous liquors, he is utterly indifferent to all the consequences of exposure to the direct rays of the sun, to the cold dews and condensed exhalations of the night; and, negligent of the necessary protection from currents of air, and fogs, and rain, he often exposes himself to each of those causes of disease, sleeping sometimes in the open air and upon the damp ground, without any substance intervening sufficient to protect him from the chilling influence of the cold damp earth on the one side, and the comparatively cold, moist, and unwholesome atmosphere on the other. Thus, the powers of life experience collapse from the exhausting effects of excessive stimulus, and the influence of depressing agents brought into immediate operation on the frame; whilst the fall of temperature and the moist air combine with the exhausted powers of the system to produce determination of the fluids from the external surface of the body to internal organs, more particularly to the bowels and liver,—the viscera which have been excited and otherwise disordered by the liquors that have been the means of occasioning such baneful exposures.

Next in importance to the use of intoxicating liquors, is exposure to vicissitudes of temperature. At the commencement of the monsoon, and during, as well as for some time after, the rains, the

vicissitudes of weather are very great; and in many situations, particularly in the more interior and highly elevated parts of India, the thermometer sometimes ranges nearly forty degrees within the twenty-four hours, and frequently from twenty to thirty degrees. During the heat of the day the circulating fluids are determined copiously to the surface of the body; and this external flow of the circulation is generally promoted by the duties, more or less, which are performed by all. During night, the terrestrial exhalations which have been carried into the higher regions of the atmosphere, are precipitated in the form of dews and fogs; and these, combined with the great fall of temperature, chill the exhausted frame, and throw the great mass of the circulating fluids upon those internal organs which are disposed, either from the constitution, habits, or negligence of the individual, to disease.

The hurtful influence of the vicissitudes of temperature is also frequently heightened by the want of suitable clothing, and proper places for sleeping. Reposing upon the ground without the requisite bedding is not unusual; and to this circumstance many cases of dysentery amongst troops, particularly when on service or in encampments, are always to be traced. Inattention, also, to the changing of wet clothes, or the inability of doing so, either from the services in which soldiers may be engaged, or from the want of requisite apparel, is amongst the most frequent causes of the disease.

These exciting agents often produce other diseases as well as dysentery; but this latter malady is most frequently the result of those causes amongst troops on actual service in a warm and unhealthy country, particularly during the rainy season, and in the vicinity of large rivers, canals, and places abounding with emanations from the decay of animal and vegetable matters. When troops are stationed in the neighbourhood of those localities, dysentery generally becomes extremely prevalent, and often assumes characters of a more or less malignant nature,—a circumstance that seems to be promoted by the presence of animal matter in the exhalations which, with other causes, combine to generate the disease. This was remarked particularly in the expedition to Java. The cases of dysentery which occurred and were treated in the vicinity of Batavia, where the country is low, moist, and abounding with putrid animal as well as vegetable matters, exposed to a hot and close atmosphere generally assumed a malignant character, and speedily terminated in ulceration and sphacelation of the large bowels.

It not unfrequently happens, that both the water and the food

with which troops are supplied, particularly on foreign service, in warm climates, are such as promote the operation of the endemic causes, or at least promote their influence in the production of this disease, in preference to fever;—many of the causes already particularised being such as, in some constitutions, would have produced fever, if the quality of the water and of the food had not determined their operation upon the bowels, assisted, no doubt, in many cases, by the predisposing causes already mentioned, and particularly by accumulations of morbid matters in the cæcum and colon.

I have frequently remarked the very powerful influence of brackish water, and water which has been kept for a considerable time shut up from the air, and in a stagnant condition, and particularly water taken from marshes, in the production of dysentery. I believe that the frequency of this disease amongst the crews of ships during the sixteenth and seventeenth centuries, especially in warm climates, was chiefly owing to the unwholesome nature of the water, acquired by being long kept excluded from the air in wooden casks. Water, under such circumstances, especially river-water, soon acquires a putrid and very offensive smell, becomes thick and muddy, and abounds with animalculæ.

Food of a bad quality is often equally injurious to the frame, and generally operates its baneful effects by either disposing the system to attacks of dysentery, or by directly exciting this disease. The flesh of unhealthy animals is particularly apt to produce very severe dysenteric affections; and sickly animals, especially sheep and bullocks, are actually killed on many occasions for the supply of the troops in India, notwithstanding the strictest endeavours on the part of the authorities and officers to procure the most wholesome animal food for the men. I have often had the most convincing proof that the use of fresh pork has been productive of dysentery, not in solitary cases, but upon a very extended scale. When the Madras European regiment was stationed at Wallajahbad, dysentery became alarmingly prevalent in it; and after the strictest investigation into the cause, it was at last found that the practice of eating fresh pork at breakfast was general amongst the men, although prohibited by the standing orders of the regiment. These orders were strictly enforced on bringing the facts to the notice of the authorities, and the disease ceased. Swine, particularly in the East, are the dirtiest feeding animals, living generally upon putrid flesh and other offensive matters.

Amongst recent visitors of a warm climate, the use of unripe or

of too much fruit is frequently an exciting cause of dysentery. Fruit acts both by irritating the mucous surface of the alimentary canal, and by disposing the other matters received into the stomach to enter into unwholesome and irritating combinations, which if the large bowels be already disposed to disorder, either from the accumulation of fæcal matters or morbid secretions, excite this disposition into action.

Dysentery is generally much less prevalent during dry and hot weather; but it is generally, when observed under such circumstances, much more frequently associated with disease of the liver than when it proceeds from cold and moisture. Thus, dysentery is not so frequent in the southern provinces of the Indian peninsula and on the Coromandel coast as it is in many of the more northerly provinces and on the Malabar coast; but in the former it is more generally complicated with affections of the liver, whilst in the latter it supervenes more frequently as the sequela of fevers, and is not unfrequently associated with disease of both the liver and spleen, but less often than in the southern provinces.

The influence of the moon in the production of dysentery, as well as of fevers, has been much discussed; and whilst it has been contended for by many very experienced writers on the diseases of India, it has been denied by others, particularly by those who have had little or no means of judging of the question. That dysentery and fever are both observed to supervene in a manner well calculated to authorise a belief in sol-lunar influence, cannot be denied by any experienced practitioner, or close observer of the diseases of India. But I do not suppose that even the most zealous supporters of this opinion mean to contend that this prevalence of disease at particular periods, corresponding to new or full moon, results from any direct influence of this planet, but from the vicissitudes which generally take place in the physical elements by which the human species is surrounded and influenced.

On the subject also of the infectious nature of dysentery, much has been advanced. As the disease is met with in warm climates, it seldom or never proves contagious. I know of no instance in which it has proved itself such in India. This, doubtless, is owing to the circumstances under which it is usually met with in warm countries, to the causes whence it most frequently springs, and to the free ventilation and attention to cleanliness which are always observed when numerous cases of this disease are admitted into hospitals. Although it appears both endemically and epidemically, under circumstances favourable to its prevalence, yet no unequi-

vocal case of communication of the disease from one person to another, who has not been subjected to the causes whence it usually proceeds, has been satisfactorily made out in India, during my practice in that country. I do not deny, however, that, under circumstances of crowding together of the sick, want of ventilation, and inattention to cleanliness, or when it is complicated with typhoid and malignant fevers, it will not evince this property: indeed, that it should evince it, is conformable to the laws which seem to influence the human economy; and is only an example of the activity of one of the causes which I am convinced is amongst the most influential in producing the disease, namely, putrid animal emanations floating in a warm, stagnant, and moist atmosphere.

The influence of other diseases in producing dysentery should not be altogether overlooked, especially as some of them often terminate in the pathological state which is efficient of the dysenteric disorder. Thus, during the progress of the various types of fever, of diseases of the spleen and pancreas, of rheumatism and catarrh, dysenteric disease not unfrequently supervenes. As the sequela of fever, dysentery is of very frequent occurrence, and here the connection of morbid action may be readily traced. As far as observation of the phenomena and progress of the fevers of warm climates, and *post mortem* examinations of fatal cases, enable me to offer an opinion, I conceive that the mucous surface of the alimentary canal, particularly of the stomach and small intestines, is affected in a very marked manner in these diseases; and that if this affection of the digestive mucous surface be not inflammatory at its commencement, it soon assumes this state in its progress, and occasions those appearances, as displayed by necroscopic research, which are uniformly viewed as being either essentially inflammatory, or the usual consequences of inflammation. Such a condition of the superior parts of the alimentary canal existing in fever, it only requires an extension of the inflammatory action of the mucous surface to that part of it lining the large bowels, to generate dysentery; and thus the complication of dysenteric symptoms with fever, or their supervention as the sequelæ of fever, is readily explained.

Amongst the natives of India, and old European residenters in the climate, dysentery frequently supervenes to the healing of chronic ulcers, particularly of the lower extremities, and to the disappearance of eruptions from the external surface. The reciprocating influence of states of the external surface upon that of the bowels, is particularly remarkable in all the dark-skinned tribes; and this

influence is, in some degree, attended to and promoted by the habits and customs of the natives of India. The attention paid by them to the preservation of a free state of the cutaneous exhalations, and the means which they habitually adopt of moderating its excess and of preventing its suppression, is perhaps one of the chief causes of the unfrequency of dysentery amongst them.

Dysentery, it will be perceived from what has been advanced respecting its causes, is very frequently met with as a sporadic disease, proceeding chiefly from morbid accumulations in the large bowels, and from the irritation which morbid secretions and other matters occasion in these viscera,—from the use of the noxious intoxicating liquors of the country,—from vicissitudes of season, weather, and temperature,—from deficient or inappropriate clothing, —from a want of beds and cots, and sleeping on the ground and in tents,—from exposure to the night dews, to moisture, cold, or to wet, particularly after great heat, exertion, fatigue, and copious perspirations,—from the use of bad water and unwholesome food, —and from frequent exposure to heavy rains, accompanied with fatigue, insufficient nourishment, and want of warm clothing.

When observed as an endemic disease, dysentery generally proceeds from marshy localities, and from the various circumstances already noticed as being productive of malaria, or putrid animal and vegetable exhalations,—from the use of unwholesome water,— and from peculiarities of climate, particularly a climate generally characterised by great heat and moisture during the day, with comparatively cold nights and evening fogs and dews.

The epidemic occurrence of dysentery seems to be connected with the general character of the seasons during which it is prevalent. A season which furnishes the exciting causes above particularised in a remarkable manner, especially during circumstances which are favourable to their operation, as fatigue, unusual exposure, deficient or improper food, want of the requisite protection from vicissitudes of weather and of temperature, may be considered as that which will favour the prevalence of dysentery in an epidemic form. But, independently of those more evident causes, there seems generally to be present some very efficient influence in the constitution of the atmosphere itself, which cannot be satisfactorily recognised in respect of its nature, although sufficiently manifest in its effects: this influence is probably dependent upon the condition of the electricity existing in the atmosphere; but what the particular electrical states are, which appear to favour the prevalence of dysentery in an epidemic form, when assisted by the usual predisposing and exciting

causes of the disease, have not been ascertained, nor have they come sufficiently within the range of observation; indeed, no satisfactory attempts have yet been made to render them matters of experiment and research. A change in the electrical states of the atmosphere is, in some degree, related to the unusual prevalence of certain maladies, and, on some occasions, to those conditions of the seasons which favour the production of disease; but in what this relation between electrical states of the atmosphere and disease exists we are entirely ignorant.

Sporadic cases of dysentery occurring amongst recent comers to a warm climate generally present signs of active inflammation, with a tendency to extend itself to the more external coats of the bowel; whilst cases supervening amongst debilitated persons and those who have resided long in a warm climate, or in the natives of the country, offer more of the signs of an erysipelatous state of inflammatory action, or a combination of inflammation of the internal surface of the large bowels with deficient power of the system, and with extension of disease to the mucous surface of the small intestines. This latter state is particularly prevalent in cases proceeding from endemic or epidemic causes and influences, as from localities abounding with exhalations from animal and vegetable matters in a state of decay, and from moist, warm, and close conditions of the air; whilst the phlogistic form of disorder is more the result of vicissitudes of temperature, exposure to currents of air, and errors in diet and regimen, amongst the young, plethoric, and previously healthy.

When dysentery supervenes with the erysipelatous characters, it may run its course as rapidly as the more phlogistic form; but it is attended with less painful symptoms, with fever of a lower type, and with greater sinking of the powers of life, and, consequently, with a greater tendency to ulceration and sphacelation: although more silent, and apparently less violent, it is quite as active as respects its progress, much more insidious, less under the control of medicine, and consequently, much more dangerous, than when attended with symptomatic inflammatory fever.

From what has been advanced, it will be perceived that dysentery is essentially an inflammatory disease,—the inflammatory action of the mucous coat of the large bowels in some cases being coeval with the dysenteric symptoms, in others supervening rapidly to them,—characterised frequently by the acute or phlogistic state; and as often by a rapid exhaustion or deficiency of power, and with low adynamic fever; and in every case accompanied with an irritative

action of the muscular coat of the large bowels, with an increased afflux to, and discharge of fluids from, their internal surface, and retention of fæcal matters in the cæcum and cells of the colon, until they are dissolved or broken down by the serous fluids poured out and passing around them.

Such is my view of the nature of simple dysentery, and of the condition of the large bowels productive of dysenteric symptoms, when either proceeding from, or associated with, disease of the liver and with fevers. When, however, the dysenteric affection supervenes either to hepatic disease or to fevers, or is associated with them, the mucous surface of the small intestines, more particularly of the lower portion of the ileum, generally presents also marks of inflammatory action as well as that of the large bowels, but to a much less extent.

The hepatic form of dysentery is commonly observed amongst those who have resided for some time in a warm climate, who have suffered from hepatic disorder, intermittent and remittent fevers, and affections of the stomach, and who have been addicted to spirituous and intoxicating liquors. Hence it chiefly occurs amongst the European soldiery in India; and, although not the most prevalent disease, is the most destructive to which they are liable. On the other hand, the simple dysentery is met with most frequently in recent comers to a warm climate, and in the natives of the country, amongst whom hepatic disease, particularly of an acute or structural kind, is rarely observed.

Amongst the natives of India, the simple dysentery is the form generally observed, the liver being but little disposed to inflammatory action in them. Dysentery, when it occurs in this class, presents but few of the acute characters, except amongst the more robust and better fed, and the natives of the higher provinces and more northerly latitudes, and then only at the commencement of the disease; and even amongst them the inflammatory symptoms are chiefly of the erythematic kind, being confined to the mucous surface, and terminating in ulceration or sphacelation, without any acute or painful symptoms. In them also the disease soon exhausts the energies of life, and assumes the adynamic form, requiring a restorative, tonic, and an astringent mode of cure.

Whether occurring as a sporadic, endemic, or epidemic disease, —whether affecting the European or native constitution,—or whether assuming the simple or complicated form,—dysentery seldom supervenes as the effect of the operation of a single cause: generally two or more of the exciting causes act with more or less activity, and

are assisted by those which predispose the frame to their influence, in the generation of the disease. Very frequently, in addition to the predisposition arising from plethora, fatigue, or loaded state of the large bowels, and a deranged condition of the alvine secretions, several of the common exciting causes of the disease, such as intoxication, exposure to the night air, wearing wet or damp clothes, insufficient clothing, sleeping on the ground, and unwholesome food, act in conjunction; and thus the predisposing and exciting causes may be variously combined, according to the very numerous circumstances in which individuals may be placed in a warm climate, and to the various contingencies of locality, weather, season, and temperature, to which they may be exposed.

Sect. IV.—*On Morbid Appearances in Cases of Dysentery.*

The appearances marked upon the examination of fatal cases of dysentery, deserve the greatest attention, inasmuch as they point out the nature of the disease, and the practice most likely to be serviceable in its early stages, before the structure of the large bowels is deranged to an extent incompatible with the duration of life. In those cases which terminate fatally, in the most rapid manner, sphacelation of the inner coat of the bowel has generally supervened, leaving, however, portions of the internal surface either entire in structure, although actively inflamed, or studded with ulcerations in various stages of their progress. From the condition of the least-changed portions of the bowel, we may infer the probable state of the parts most disorganised before structural change took place, especially as such change is a frequent consequence of the inflammatory action actually observed in the parts of the mucous surface which have not been destroyed by it, either in consequence of the inflammation supervening at a remoter period of the disease, or being of a less acute character.

Hence, as may be expected, we find, upon the examination of fatal cases soon after death, the effects of the disease rather than the disease itself. But as these effects are the legitimate consequences of inflammation, and as inflammation, in all its stages and with all its usual effects, is uniformly observed, the inevitable and only inference which can be deduced from them is, that the disease consists of inflammation of the mucous surface of the large bowels, and that our method of cure should be devised with a view of removing this state as well as the causes which tend to perpetuate it.

It is extremely probable that the inflammatory action has been

occasioned by some irritating cause lodged in the *prima via*, inducing simple irritation, in the first instance, of the capillary vessels and exhalants of the mucous coat of the large bowels, or by other causes acting upon the body from without, and producing a determination of the circulating fluids to the same situation, and a similar condition of the vessels; but in whatever way it may originate, there can be no doubt that inflammatory action is, in the acute form of the disease especially, almost coeval with the dysenteric character of the stools; and the treatment which is founded upon this view will generally be the most successful in combating this disease as it is observed in warm climates. But whether dysentery originates in simple irritation, attended with increased exhalation, and terminating in acute inflammation of the mucous surface of the large bowels, or consists of inflammation of this surface from the commencement of the disease, is a question which cannot be solved by *post mortem* examinations. Both these pathological states may be present in different cases, and may depend upon the causes producing the disease, and the constitution of the individual affected: from their nature they may be expected to produce analogous symptoms, and such as we observe generally to characterise the commencement of dysenteric affections.

Omentum.—This part is frequently inflamed, owing evidently to the extension of the inflammatory action to the peritoneal surface of the large bowels, and thence to this part. Sometimes it adheres, through the medium of coagulable lymph, to the more superficial convolutions of the bowels, at other times to the anterior part of the brim of the pelvis, or even to both: more frequently it is drawn up irregularly to the arch of the colon, and occasionally it seems wrapt close up to this part of the large bowel. Sometimes it is drawn to one side, and adheres both to the colon and to the abdominal parietes. These appearances are the more marked, if the ulcerations in the large bowels, have perforated the bowel, so as to occasion the extravasation of its contents into the peritoneal cavity, thereby producing general peritonitis; and when the dysentery has been complicated with hepatic disease.

Large Intestines.—Sometimes these viscera present no external marks of disease to a superficial observation, yet they will be found extensively disorganised when laid open. It is, perhaps, owing to their apparently healthy condition externally, that we so frequently have been furnished with accounts of a natural state of the large bowels having been observed in dissections of fatal cases of dysentery. The inference, to my mind, upon reading such accounts, is

that the individuals who furnished them have not inspected the seat of the disease which they had been attempting to investigate,—an error of very common occurrence in *post mortem* examinations of the condition of the intestines; for, although the colon may not be remarkably diseased in its external surface, it generally presents, on a close examination, one or more of the following states:—It is more or less distended with flatus—the colour of its surface is various in different cases, and the shades differ in different parts of the same bowel. Upon grasping the viscus, and running the fingers along it, a different feeling is communicated to the touch in distinct parts of it: at one place it is thickened and doughy, in another, thin and membranous. In one part the general shade of colour externally is a bluish-gray; in another, a greenish-blue: in one case it is verging to purple; in another, it is pink: sometimes it is obviously inflamed in its serous covering, the capillaries, distended with blood, running in all directions, and forming a close reticulum in its surface; occasionally the colour of the surface is quite natural, and the peritoneal covering possessed of its natural diaphanous appearance.

The shades of colour presented by the cæcum and colon externally, although frequently depending upon, or having some relation to, the states of the internal coats of these viscera, yet sometimes have no such dependence: thus I have observed, in cases where the peritoneal surface was the most pale, the internal or mucous surface of the bowel was most deeply diseased, of the darkest colour, and either sphacelated or extensively ulcerated. In other cases, where this viscus was externally of the deepest colour, varying in some parts from a brick-red to a reddish-brown or deep purple, the internal surface has sometimes presented less than usual marks of disease in those situations. Hence, although the colour of the bowel externally may frequently depend upon the state of disorganisation existing internally, yet no such connexion should be necessarily expected.

Displacements, elongations, and unnatural convolutions of the colon, are not unfrequently observed in dissection of dysenteric cases. These have been already noticed; but it may be further observed that they are generally connected with some degree of relaxation of the longitudinal bundles of fibres which draw the colon into a sacculated form when in a state of contraction, so that the bowel in those states seldom presents many of those deep circular folds which form its cells; or they exist only in a small degree. In the majority of cases wherein displacements or elongations of the

colon have been remarked, its peritoneal surface has been inflamed in parts, particularly that portion which was displaced. This is shown where coagulable lymph may be seen covering the displaced portions, and connecting their surfaces either to each other or to adjoining parts, and sometimes to both. Amongst the most frequent displacements of the colon remarked, are,—first, a loop of the sigmoid flexure descending low into the pelvis, close to, sometimes adhering to, the urinary bladder and rectum, and explaining the disorder of the urinary function remarked through the progress of the disease; second, the descent of the transverse arch of the colon, generally towards the right side, nearly as low as the pubes.

Sometimes the cæcum and colon are distended with a fœtid flatus throughout, and the calibre of the bowel every where increased. In many cases the distensions are partial, some parts of the viscus being much constricted. The constricted portions are occasionally very small, appearing as if a ligature were obstructing the canal of the intestine. In other cases the constriction involves a considerable portion of the colon. Nor is this lesion confined to one part of the colon,—this viscus frequently presenting several parts in a more or less constricted state, with the intervening portions much distended, either with flatus alone, or occasionally with flatus, feculent matters, and morbid secretions. The distended parts of the colon are chiefly those near the cæcum and transverse arch, whilst constrictions of the bowel are most frequently remarked about the sigmoid flexure and near the rectum: the transverse arch is also frequently contracted to a very great degree, and this particular state is sometimes altogether confined to this part of the bowel, and occasionally the sigmoid flexure and the rectum are similarly affected. Indeed, every part of the large bowels from the cæcum to the verge of the anus, is occasionally found the seat of contractions as well as of distensions, in the examination of fatal cases of dysentery; and the constrictions are present in every degree, vary in number from one to five or six, and occasionally they are much more numerous.

The constrictions in some cases seem to be chiefly the result of a spasmodic action of the circular fibres of the part affected, owing to the irritation and inflammation of the internal surface: In other cases they seem to be of a more permanent nature; although most probably at their commencement they were the consequence of spasm. When the parts contracted are also found externally inflamed, thickened, and hardened, and in a semi-cartilaginous state, as they frequently are in the more chronic cases, their nature cannot be mistaken; and they must be viewed as one of the results of a

state of inflammatory action, or of acute inflammation terminating in the chronic form: they are also very often the effect of repeated attacks of the disease. Sometimes the constricted portions of the bowel are remarkably inflamed externally, and occasionally they present in the peritoneal surface no very evident appearance of inflammatory action; although, internally, both inflammation and its consequences are present to a great extent. The narrow constrictions, as if from a ligature, are those which least frequently offer an inflamed appearance externally.

When the constrictions tend nearly to efface the canal of the bowel, the part above is usually much distended, and in some cases the coats of the distended portion are lacerated, and the contents of the bowel effused into the peritoneal cavity. The laceration seldom takes place in a sound part of the bowel; it generally occurs, or at least commences, in a part which has been ulcerated internally, and softened by the existing inflammation. The laceration of the distended part of the bowel is mostly soon followed by the death of the patient, but seldom before evidences of general inflammation of the peritoneal surfaces have been produced by the effused matters, and the bowels are glued together by coagulable lymph; and albuminous exudations, with a turbid serum, are poured out into the abdominal cavity. Sometimes the lacerated portion of the bowel is situated below a constricted part. When this is the case, there is always found a still more constricted portion below the laceration, which is situated in a more or less distended part of the bowel; although, after the laceration has taken place, the extent of the previous distension cannot be ascertained. In addition to the contractions and constrictions of the colon, the parts thus diseased may be still farther deranged: they may be very closely adhering to adjoining viscera, or pressed upon by parts morbidly distended; or they may form very sharp turns and convolutions, tending still further to obstruct their canals; or they may be encumbered by large effusions of coagulable lymph upon their external surface, forming bands or artificial ligatures in the processes of condensation and adventitious organisation, which these effusions often experience when life is prolonged for any considerable time after they first take place.

When the inflammation of the internal coats of the bowel has proceeded externally so as to implicate the peritoneal covering, *post mortem* examinations, if performed sufficiently early after death, generally disclose the external surface of the large bowels in a state of high vascularity; sometimes of a deep pink hue, at other

times of a reddish-brown, and occasionally with signs of congestion as well as of arterial action, the peritoneal coat of the bowel then having a purple appearance. In addition to these, the adjoining surfaces are glued together by a thin coating of coagulable lymph; or considerable masses of this substance are effused and partially organised, generally between the duplicatures of the bowel, and in the angles formed in its course in the abdomen. The intervening parts of the external surface are often not much changed in colour: the tint is sometimes more deep, and at other times more or less unnatural, marking considerable disorganisation of the internal tunics of the bowel; and occasionally there are distinct clots of coagulable lymph upon the surface, sometimes pointing out the situation of an internal ulceration, which had nearly made its way to the peritoneal covering of the bowel. In some instances the ulcerations, when they have proceeded thus far, rise like the variolous pustule on the surface of the intestine.

In addition to adhesions found between the cæcum and colon, between different parts of the latter viscus, or between it and the rectum, the colon is very frequently connected by means of coagulable lymph, of a more or less firm consistence, to the inferior surface of the liver, or to the spleen, small intestines, or to the opposite parts of the abdominal parietes; and these adhesions are sometimes complicated with distensions of the bowel, or with constrictions such as have been described, or with both in the same case. The *appendix vermiformis* is generally involved in the morbid changes affecting the cæcum; and the *appendiculæ epiploicæ* are diminished in size, and have a gelatinous appearance. The colon, in the majority of cases, has lost its divisions into numerous cells; and it presents a more or less uniform surface, with thickening, and a lacerable state of its coats.

Having described the *external* appearances presented by the large bowels, in examinations of dysenteric diseases after death, I now proceed to notice the more remarkable changes which are observed in the *internal* surface of these viscera; and shall then enumerate those lesions of *adjoining viscera* which are usually detected in the more complicated forms of dysentery.

The appearances presented by the first stages of inflammatory action cannot be expected to be found upon dissection, unless when supervening secondarily. The earliest morbid change which is disclosed by examination after death is a very bright red-colour of the mucous surface, from a minute injection of its capillaries. This is only observed in parts of the bowel: the inflammatory action, which

is here at its acmé, having, in some portions of the viscus, occasioned abrasions of the mucous coat; in others, terminated in ulceration; and in some parts in sphacelation. The most uniformly red colour of the mucous surface of the cæcum, colon, and rectum, observed in dysenteric cases, has seldom or ever been devoid of ulceration in some one of its stages. Those portions of the internal surface which are deeply inflamed are often deprived of the mucous membrane to a considerable extent: sometimes the mucous coat is detached merely in a small space, seldom exceeding the size of a sixpence; the edges of the still adhering portion being somewhat elevated and irregular, but always deeply inflamed, unless the parts have lost their vitality altogether, and become sphacelated, which is frequently the case. Sometimes a great number of these small abrasions of the mucous coat is formed: at other times only one or two. This detachment of portions of the mucous membrane seems to arise from the extension of inflammation to the subjacent cellular tissue, connecting it with the muscular coats of the bowel, and from an effusion of fluid underneath, thus depriving the mucous tunic of its connexion with the parts from which it derives its vitality; and hence it sphacelates, and is thrown off with the fluids effused beneath it.

When sphacelation supervenes to the acute inflammatory state, and attacks one or more of the tunics of the bowel, in addition to the mucous coat, then the part so affected loses, in a great measure, its florid appearance, and assumes a greenish, greenish-brown, deep-green, or dirty purple hue; or it presents a dark-grey or brownish-grey appearance. The transition from a florid red to these very different shades of colour is often very sudden; and the tints are variously disposed, so as to have a dotted, streaked, or shaded appearance.

When patches of the mucous surface have been detached and entirely removed from their situations, the parts of this surface intervening and still remaining in their places may readily be removed from the subjacent tissue: sometimes they are already partially separated, admitting a probe to be passed beneath them; and occasionally their edges float loosely in the bowel.

Ulceration is one of the most frequent consequences of the disease, and is often observed in addition to the appearances now described, or independently of them; but although these appearances are very often, and, indeed, generally conjoined with ulceration, in some part or other of the large bowels, or in some of its stages, yet occasionally, an inflamed, excoriated, and sphacelated state of

the internal tunics of these viscera is observed, uncomplicated with any ulcerative process. The ulcerations which are so frequently observed in the large bowels in dysenteric cases vary very much in their character. Sometimes they are small and thickly clustered together; occasionally they are large, distinct, and placed at considerable distances from each other; and very frequently they are small and nearly confluent in one part, and large and distinct in another part of the same bowel. In some cases the ulcerated bowel presents but few marks of inflammatory action, excepting at the margins of the ulcers. Occasionally the coats of the bowel immediately surrounding the ulcer are thinner and softer than in the intervening sound parts; but most frequently the ulcerations present thickened and elevated edges.

In those cases wherein the ulcerations are placed as it were in the centre of an elevated and thickened base, the disease appears to have commenced in the mucous follicles, and to have advanced, in a chronic form. Sometimes the ulcerations, which are thus surrounded by a thickened and elevated base, present appearances of exuberant granulations shooting up from their centre; in other cases the ulcerations are sloughy in their centres, and their edges of a very dark colour. Some of the ulcerations seem to have arisen chiefly from the extension of the inflammatory action to a part or parts of the subjacent cellular tissue, and to the consequent destruction of the mucous surface covering the parts thus affected. As to the situation of these ulcerations, it may be stated, that they are generally most remarkable, both in respect of size and number, in the cæcum, and next so in the sigmoid flexure of the colon and rectum. But the left arch, ascending, and transverse portions of the colon, and indeed every part of the large bowels, are often very deeply ulcerated. Sometimes the ulcerations have destroyed no more than the mucous surface, at other times they have made their way to the peritoneal covering of the bowel, and occasionally they have entirely perforated its coats.

In almost all cases of ulceration of the large bowels, the parts ulcerated are softened or more friable, so that they are readily torn upon forcible extension; and if the parts situated between the ulcerations be inflamed, as they generally are, they are also lacerated with ease. Want of the cohesion characteristic of healthy textures seems to be generally present in nearly all instances of the disease accompanied with acute inflammation, or any of its consequences.

Besides the general appearances characteristic of inflammatory action, or resulting from this state, which have been described, the

coats of the large bowels seem much thickened. This is particularly observable in the sub-acute and chronic cases of the disease. A certain degree of tumefaction or fulness of the inner coats of these bowels seems to depend upon the inflammatory state, and to arise from the general injection of the vessels, and effusion of fluid in the cellular tissue connecting their various coats. A thickened condition of the large bowels is, however, not uniformly remarked: in some few cases their parietes seem thinner than they are even in the healthy state, and are, at the same time, ulcerated to a greater or less extent. Occasionally, one part of the viscus is evidently thinner than natural; whilst another portion is much thickened and as if corrugated.

The colour of the internal surface of the large bowels varies very much in different cases, as well as in the same case. In some it is of a very deep red, streaked transversely, and dotted in parts with a darker tint; the edges of the deeper ulcers, and the centres of those in the incipient stages, being of a still darker colour. Sometimes, intervening between large portions of deeply inflamed and ulcerated colon, the mucous surface presents a pale, greenish-yellow hue, with or without small specks of ulceration. Occasionally, the intensely red colour is variegated by the different shades presented by the slight duplicatures and corrugations of the mucous surface of the bowel, and gradually passes into a yellowish or vermilion-red, and thence into a darker shade, indicating the transition to the sphacelated state. In some cases, nearly the whole of the mucous surface of the cæcum and colon is of a greenish hue, and presenting every depth of shade from a pale grass-green to an olive colour; in some parts the deeper shades of green are interspersed with patches of a fine rose-colour: in these latter the mucous tissue possesses its natural organisation, whilst, in the former, its cohesion and structure are entirely destroyed, and it is in all respects in the first stage of gangrene.

In some of the more chronic or sub-acute cases, the internal surface is of a very deep reddish-brown, passing in some parts to a black colour; in others the mucous coat is of a very dark olive hue, or of a deep bottle-green, passing into a black in numerous places, and finely streaked and spotted with black, and sparingly studded with red spots and with fungus-like ulcerations. In some instances the ulcers are nearly black, more particularly their edges much elevated, and the coats of the bowel in their immediate vicinity greatly thickened and inflamed, whilst the intervening surface presents every shade of colour, from a pink to a rose-colour, scarlet,

and deep brick-red, and red streaked with black. In other cases, the mucous surface of the cæcum and colon, and occasionally of the ileum also, is of a black hue, interspersed with spots of a brick-red colour, and with elevated ulcers of a somewhat lighter shade in the centre. The colon, in some of the more chronic cases, is of a reddish-brown, shaded with black, and studded with small ulcers of a paler colour, or with larger ones having an inflamed and sloughing base, or with both. In other chronic cases, the internal surface of the large bowels is partly of a pale-violet colour, variously clouded or streaked, and passing abruptly into a deep bottle-green: occasionally this latter colour occupies nearly the whole internal surface of the colon, and is of a gristly or semi-cartilaginous consistence.

When the internal surface of the colon is of a pale-grey or sea-green colour, either with or without ulceration, an extenuated state of its parietes is occasionally observed. In addition to these appearances, the coats of the bowel are often torn with ease, even although marks of inflammation, with the exception of the atonic ulcers previously described, are by no means visible.

In some cases, where inflammation of the internal surface of the cæcum has proceeded through the tunics of the bowel, the cellular substance, external to it and connecting it with the psoæ muscles and parietes of the iliac region, becomes inflamed, abscess forms in this situation, and is detected after death, if it has not opened into the cæcum, and discharged itself during the life of the patient. The *appendix vermiformis*, besides being inflamed externally, and adhering to the cæcum or adjoining parts, is often internally ulcerated, contracted in size, easily lacerated, and occasionally almost sphacelated.

The appearances already described are those which are most immediately related with the dysenteric affection, and which constitute the whole organic derangement usually found in the simple or uncomplicated form of the disease. Those lesions now to be noticed are chiefly observed in the complication of dysentery with affections of the liver, and in those forms of the disease which supervene either in the progress of fevers, or during convalescence from them.

In addition to those lesions of the large bowels now described, the liver often presents some one of the various changes noticed in a previous part of this work, when the diseases of this organ were the subjects of inquiry. In the complication of hepatic disease with dysentery, the association of structural changes of the liver with disorganisation of the large bowels is constantly observed: it is this complication of lesions which constitutes the true hepatic dysen-

tery. When the liver is found diseased, in fatal cases of dysentery, the small bowels are frequently diseased also, especially when the morbid changes existing in the liver are of a chronic kind. In complicated organic changes of this kind, it is presumable that the morbid secretions proceeding from the liver had been a cause of irritation both to the small and to the large bowels, and that these secretions had made their chief impression upon the latter in consequence of the greater predisposition to morbid change, arising from accumulation of fæcal matter in the large bowels, and from the remora which the substances poured into them generally experience from their situation and structure. The great irritability which the small intestines possess, and, consequently, the quick passage of their contents along their canal,—a quickness promoted by the situation and loose connexion of these viscera,—are circumstances which are very influential in preserving them from suffering from the irritating effects of their contents in so marked a manner as the large bowels, although by no means exempting them from all disorder. That they do suffer, however, in a very marked manner, when the liver is diseased in dysentery, is a matter which is frequently shewn by *post mortem* examinations; for they generally exhibit marks of inflammatory action having existed in their mucous surfaces, and sometimes the inflammation extends through all the tunics of the intestine to the peritoneal surface, and may perhaps be attended with ulceration of the inner coats. In a word, in cases of dysentery complicated with organic change in the liver, the small intestines frequently exhibit appearances of disease similar to those described when inflammation of these viscera were treated of.

Besides the external appearances of inflammatory action in the small intestines, this part of the alimentary canal is often extremely constricted: in some cases this constriction is very limited in extent, in others it exists along a considerable portion of the intestine: rarely, the constriction has the appearance of having been made by a ligature, from the limited space affected.

The mucous surface of the small intestines is very frequently more or less inflamed in cases of dysentery complicated with disease of the liver, and in conjunction with appearances of inflammatory action, ulceration is not unfrequently observed, particularly in the lower part of the ileum, and at its termination in the cæcum. In the simple form of dysentery, however, the inflamed state of the digestive mucous surface generally terminates abruptly at the valve of the colon,—the lower portion of the ileum, and indeed the whole of this intestine, being exempt from appearances of inflammatory

action. In some fatal cases of dysentery, the spleen is found diseased; in others, the pancreas; and, on a few occasions, both the spleen and pancreas; and lesions of these viscera have not only been observed associated with the disease of the large bowels constituting the dysenteric affection, but also with affections of the liver and small intestines.

Inflammation and enlargement of the mesenteric glands, more particularly of those situated in the meso-colon, are very frequently found in the examination of fatal cases of dysentery, especially in the more chronic forms of the disease, and in subjects who have experienced frequent attacks. The morbid states of the glands seem to proceed chiefly from the irritation of the mucous surface of the intestines, and the determination of blood to the parts in their vicinity and immediately surrounding them.

When the disease has involved the serous covering of the bowels, the mesentery also frequently presents greater vascularity than natural; and in some few cases coagulable lymph has been found upon its surface, even although the ulcerations of the bowels have not entirely perforated their coats. This case of the mesentery is mostly remarked in the complicated forms of dysentery, and when the disease supervenes in the progress of fevers, or during convalescence from them. The appearances observed in dysentery occuring in these circumstances, are but little different from those already described. The small intestines, however, are generally more than usually affected in such cases, and very often exhibit ulcerations in various stages of their progress. In many cases, the ulceration of the small intestines is attended with appearances of active inflammation of their mucous surface: in other cases, the inflammatory action had evidently subsided in the small bowels soon after the affection of the large; for small ulcers have been observed in the former, some having a cicatrised form, others a pale aspect, without evidences of much increased vascularity of the intervening parts, whilst the cæcum, colon, and rectum, were very deeply inflamed and ulcerated, or even sphacelated. Here the succession of phenomena seems obvious: the febrile disease, in such cases, was attended with a relaxed state of the bowels, marking the disease of the mucous surface of the small intestines; and as the inflammation extended to the large bowels, so the dysenteric symptoms supervened, and the disease assumed a new character.

The cases of dysentery occurring during the progress of, or upon convalescence from, fevers, sometimes also present us with additional appearances of disease in the liver, pancreas, spleen,

stomach, and still more frequently in the mesenteric glands. But these appear to be rather contingent affections, and are not constantly met with. The diseased state of the mesenteric glands is more uniform, but consists chiefly of simple enlargement, sometimes with signs of inflammatory action, and occasionally with a sero-purulent-like infiltration of their substance and of the cellular tissue surrounding them: sometimes they are of a much darker colour than natural.

The derangement of the urinary organs usually accompanying dysentery would lead us to expect marks of disease in them upon examination after death; but these organs seldom present much structural change. Occasionally, however, the peritoneal surface of the urinary bladder is inflamed, and its coats contracted and thickened: sometimes the prostate gland is somewhat enlarged, and the neck of the bladder inflamed,—effects evidently proceeding from the diseased state of the adjoining viscera.

Sect. V.—*On the Treatment of Dysentery.*

There are few diseases in which the advantages proceeding from the employment of decided measures at an early stage of the malady are more conspicuous than in the forms of dysentery which come before the intertropical practitioner. The nature of the disease, and the consequences which generally supervene in its progress, are such as absolutely require early and active measures in its treatment. It is not, either in its essence or its tendencies, like unto many maladies of temperate climates, which will frequently bring about their own cure, if not materially interfered with. On the contrary, if left to nature, or improperly treated, it tends to the disorganisation of the viscera which are its seat, and to the destruction of life.

The observations I shall offer on this very important subject will, *first*, refer to the simple and acute form of the disease; and, *secondly*, to its association with affections of the liver. Those modes of cure which have a stricter reference to the chronic state of dysentery will be considered hereafter; as well as the management of the dysenteric symptoms supervening in the course of fevers or complicated with scurvy.

First. The treatment in the uncomplicated dysentery must, in a great measure, be accommodated to the period or stage of the disease; and directed so as to accomplish certain intentions founded upon the pathology of the disease. The indications of cure, which

we should propose to ourselves, are to remove offending matters from the large bowels; and to guard against the supervention of inflammation, and to remove it if it have supervened. To these may be added other indications of a subordinate nature; but they are chiefly beneficial in either directly or indirectly promoting the two great objects now stated. I shall not, therefore, particularise them until they come under consideration. It should, however, be recollected, that the measures which tend to fulfil one of the above intentions generally assist in the accomplishment of the other.

If the patient comes under treatment when the premonitory symptoms of disorder are present,—when the bowels are first disordered, and he complains of chills, followed by slight flushes, coldness of the back and loins, &c.,—the exhibition of an ipecacuanha emetic, followed in a few hours by a full dose of calomel, and in ten or twelve hours more by a purging draught and an enema, is often of the greatest benefit. At this time also the warm bath is of great service, by determining the circulation to the external surface of the body, and taking off spasms, whilst the evacuating remedies directed to the *prima via* unload it of those accumulations which are so frequently instrumental in producing the disease.

When acute dysentery is fully developed, and the patient complains of a sense of heat, burning, soreness, pain, tormina, &c., then depletion is absolutely requisite, and the sooner it is employed after the supervention of those symptoms, the more likely is advantage to be procured from it; and if he have been resident for a considerable time in the climate, local depletions, followed by hot fomentations or warm poulticing, when the leech-bites have ceased to bleed, will generally be sufficient. Depletion to a great, or a sufficient extent, may be practised in this way. But if the patient has recently arrived from Europe, if he be of a full habit, if the pulse be full, hard, and irritable, if the tormina be violent, and pain fixed and increased on pressure,—a full blood-letting from the arm should always precede the application of leeches to the abdomen.

If the first blood-letting be sufficiently large, a repetition of the operation will be seldom necessary, but a second general depletion is often required. The sensations of heat, burning, and soreness, in the course of the colon, are indications of inflammatory action, and, when complained of, local depletions at least ought never to be dispensed with; and even when the energies of the system appear inadequate to sustain further evacuations, the application of only three or four leeches will often be of service.

The copious discharge of blood by stool, characterising the dis-

ease, should never prevent us from resorting to vascular depletions; for it ought to be remembered, that when the acute form of dysentery is treated actively by means of depletion at its commencement or in its earlier stages, great losses of blood by stool seldom occur; and even although such discharges may have already taken place, they should not prevent the adoption of blood-letting, if no other symptoms are present to render it improper; for by resorting to it, either generally or locally, further losses in this way are prevented, and the internal surface of the bowels is thus indirectly guarded from sustaining injury.

In old residenters in warm climates, and in the native inhabitants, the application of leeches to an extent suitable to the circumstances of particular cases is sufficient for all the purposes which blood-letting is calculated to fulfil. But in these subjects particularly, the local depletion must be made very early in the disease, and before the energies of the system are much impaired.

In addition, also, to early depletion, the practitioner should endeavour to procure a full evacuation of the bowels. With this view, twenty grains of calomel combined with one or two of opium should follow the first depletion, whether that be local or general, and ten or twelve hours afterwards a purging draught, assisted by an injection, should be administered. The previous exhibition of the calomel and opium generally allays the irritability of the stomach if this symptom be present, removes spasms, and prepares the morbid secretions of the liver and bowels for removal by means of the purgatives which are to follow. So long as we are convinced, by a careful inspection of the stools, that feculent matters continue in the cells of the colon, so long must we persist in the exhibition of purgative remedies. The appearances which chiefly indicate the existence of this source of irritation are, a foul and loaded tongue, fulness of the abdomen, especially in the caput cæcum coli and course of the colon, the presence of broken-down fæces in the stools, or pieces of fæces mixed with a watery brownish serum, and a slimy mucus at the bottom of the vessel. Whilst these matters remain in the bowels the cause of disorder continues: and measures should be persisted in until the cause is removed.

The means which should be employed in order to evacuate these morbid accumulations ought also to be calculated to relax the spasmodic action of parts of the colon, which generally accompanies the dysenteric affection. Hence the propriety of combining calomel with opium, and of following the exhibition of purgatives by the mouth with laxative, emollient, and antispasmodic injections.

The relaxing effects of hot poultices and fomentations after local depletions are also beneficial, and tend essentially to procure a free action of the bowels, and to moderate the attendant tormina and tenesmus.

The employment of purgatives, especially of calomel and opium, at bed-time, followed by a purgative in the morning, and a laxative and emollient injection shortly afterwards, should be continued as long as the state of the evacuations, and the tormina, &c. indicate the retention of morbid matters in the *prima via*. One of the chief reasons for the exhibition of calomel with opium at bed-time is the influence it generally has in procuring a quiet night for the patient, mitigating the severity of the symptoms, and in diminishing the frequency of the calls to evacuation, whilst it renders the motions more free and copious afterwards, and promotes the determination of the circulating fluids to the surface of the body.

Soon after the exhibition of calomel and opium at bed-time, a small anodyne enema may be thrown up with advantage, as it generally assists the operation of the calomel and opium in procuring rest during the night,—an object of the utmost importance in the treatment of diseases in a warm climate. It should always be the aim of the practitioner to moderate the harassing efforts to stool during the night; for nothing tends more to exhaust the patient, and to bring on an adynamic state of the system, than the want of sleep thereby occasioned, and the irritative state of fever which it induces. Besides, the patient is much exposed to the cold, chilly, and foggy night-air, by often leaving his warm bed frequently when in a state of perspiration.

The debility so generally supervening in the progress of dysentery has been urged as an objection to the remedial measures recommended, especially to the vascular depletions. This is an error; it is not debility, but oppression of the vital power, and the unfavourable symptoms which supervene in this disease, are much more frequently met with when depletions are neglected; and the acute form of the malady oftener terminates in chronic dysentery and diarrhœa, should the patient survive when these means are neglected, than when they are employed.

Should the patient be brought under treatment late in the day, with the disease fully developed, but not in a too far advanced stage of it for active treatment, the depletory measures recommended should be immediately adopted, and followed by the application of hot poultices, fomentations, or the warm bath. The calomel should be given immediately after these means have been employed, in

combination with a full dose of opium, and the patient left to repose for the night. If there be urgent tenesmus and frequent calls to evacuation, an anodyne injection may be thrown up, and early on the following morning the purgative medicines recommended should be administered, and repeated so as to procure copious substantial evacuations from the bowels.

Not only is the choice of purgatives attended with much difficulty, but the frequency of repeating them, and the length of time during which they should be exhibited, are also matters requiring great discrimination. I seldom or never have found it necessary to repeat the purgatives oftener than once in the day, a full dose having been prescribed early in the morning, and the time during which this practice should be continued must depend upon the duration of the symptoms indicating the existence of morbid and irritating accumulations in the large bowels. Care should, at the same time, be taken not to mistake the irritation and tenesmus accompanying inflammatory action of the sigmoid flexure of the colon and rectum, for the disorder occasioned by the lodgment and retention of fæcal matters; for in this case, the too frequent or long-continued exhibition of purgatives would be extremely detrimental.

Amongst the means resorted to, either to evacuate freely the large bowels, or to allay irritation of them, there are none more beneficial than injections. When the former end is desired, gently purgative injections should be preferred; and amongst these, none is more deserving of notice than the decoctum lini with the tartrate of potass, or the soda tartarizata, and the decoctum oryzæ with the oleum olivæ, or with the oleum ricini. All irritating substances should be discarded. If the practitioner wish to dilute the contents of the large bowels, and soothe their internal surface by means of emollient and demulcent substances, then the injections should be large. When it is his object to procure the evacuation of their contents, this end will be best attained by injections of moderate bulk, seldom exceeding that of twelve ounces, or less than six; and they should be thrown up steadily and forcibly, without attempts to remove the instrument for some time.

In the irritated state of the large bowels characterising this disease, the injection of a large enema generally occasions re-action of their muscular coats upon the distension occasioned by it, and it seldom is productive of any other advantage than that of diluting the fluid matters it may meet, and of washing away a part of the irritating

substances which these viscera may contain. But even this is an object worth obtaining, and should not be neglected.

To allay the irritation of the bowels, and of the system generally, —one of the principal objects which is required to the removal of the disease,—none can be more efficacious than the injection of anodyne enemata. Of these the decoctum lini, decoctum oryzæ, with mucilage, combined with opium, or with the ext. conii or ext. hyoscyami, are preferable, and should be administered in small bulk, so as to be retained sufficiently long for the production of their full effects. Enemata of this kind should seldom be more than two or three ounces, and should be repeated frequently.

It will always be advantageous to determine the circulation to the surface of the body, and thereby to take off the tendency of the fluids to flow to the seat of disease. This end is partly accomplished by the combination of calomel and opium taken at bedtime, as already recommended; and it may be farther promoted by the addition of a little of the pulv. antimon., or James's powder, or of a grain of ipecacuanha, to these remedies. This is an indication of cure which is obviously recommended to our adoption by a consideration of the nature of several of the exciting causes of the disease, and by the phenomena supervening in the system immediately previous to, and at the commencement of, attack. Amongst the most useful means to accomplish this intention is the administration of Dover's powder by the mouth, either in small and repeated doses, or in large doses given at longer intervals. The saline mixture, composed of camphor julep, liq. ammon. acet., sp. æther. nitr., and the vin. ipecac., given every two hours, is also extremely beneficial.

In the majority of cases, the ipecacuanha will be found preferable to antimony as a sudorific in this disease. When the stomach cannot bear the ipecacuanha and opium in doses sufficient to produce a free effect upon the skin, much benefit will sometimes be derived from using an infusion of ipecacuanha in the form of enema, either alone or in conjunction with opium. Sometimes the exhibition of opium, with the view of obtaining either its anodyne or diaphoretic effects, produces considerable disorder of the functions of the brain, with excitement and determination to this part. When such is the case, the combination of this remedy with camphor will generally be found advantageous, both in counteracting these unpleasant effects, and in obtaining the results which we intend to produce.

Having exhibited the calomel and opium at bed-time, given a purging medicine early in the morning, and administered such enemata as the particular circumstances of the case require, the employment of the remedies now recommended in order to determine the fluids to the external surface of the body, should be assiduously persisted in through the day; and when the patient is disturbed in the night, they may be given in conjunction with an anodyne, or a small anodyne enema may be thrown up.

Tepid and warm bathing are often serviceable after the means now specified have been put in practice, and tend to promote the action of the diaphoretic remedies, and to relax the external surface of the body. The temperature of the bath should not be so high as to excite the system generally, but of that moderate heat which is most efficacious in subduing irritability and in equalising the circulation. After coming out of the warm bath, the patient should be kept as much as possible from currents of air; and the determination to the surface of the body ought to be promoted by the use of warm mucilaginous diluents and the diaphoretics already named.

The warm bath also is often extremely efficacious, in relieving the tenesmus and tormina characterising the disease, and in diminishing the frequency of the calls to stool. When either strangury or dysuria is present, it ought never to be neglected, as it is one of the most efficient means we can adopt for the purpose of relieving these very distressing symptoms.*

When the practitioner conceives that the purgatives exhibited early in the disease, and the general or local blood-lettings, followed by the remedies commented upon, have removed offending matters from the bowels, and subdued inflammatory action; and when the symptoms seem chiefly to proceed from a sore and irritable state of the bowels remaining after active disorder is subdued,—the application of a large blister upon the abdomen is generally followed by much advantage. When, however, the signs of active disease still remain, and the patient complains of frequent or painful micturition, blistering the abdomen is seldom productive of benefit, but often, on the contrary, adds to the general febrile excitement of the system, and to the painful symptoms connected with the urinary organs. Prescribed with the view of removing the disorder remaining after the successful operation of the more active means already detailed, and to subdue the irregular spasmodic actions to which the colon and rectum are liable, from the passage of morbid secretions and fæcal matters over their sore and irritable internal

surface, blisters are extremely beneficial, and should never be omitted under any circumstances.

As the disease advances, pain in the cæcum and course of the colon not unfrequently supervenes, even although vascular depletions and purgatives have been judiciously employed in its early stages. When this is observed, the application of leeches is necessary, and their number should be according to the severity of the symptoms, strength of the patient, and the general character of the pulse and other symptoms. After the bleeding from them has ceased, warm poultices should be assiduously employed, and afterwards followed by a blister. Under such circumstances, the lowered strength of the patient should not altogether deter us from the application of a few leeches, for the advantages accruing from the application of them, and from the means by which they should be followed, will much more than compensate for any debility they may occasion.

In the far-advanced stage of the disease, after the above measures have been employed without deriving from them those advantages which they are calculated to afford, and generally do afford; or when the patient has been neglected or injudiciously treated at the commencement of the malady, the existence of ulceration of the large bowels, either in its incipient or farther-advanced stages should be dreaded; but we ought not on that account entirely to despair of the recovery of the patient, although an unfavourable termination is more likely to supervene. I have known many cases of recovery wherein the symptoms clearly indicated the existence of ulceration; and even after large portions of the mucous surface of the large bowel had been detached and evacuated with the discharges. Until unequivocal signs of approaching dissolution are present, our means of cure should be administered zealously and unremittingly, and be judiciously selected and applied, according the symptoms which may supervene.

At this period of disorder, the warm bath; blisters over the abdomen; emollient, mucilaginous, and anodyne enemata; small and frequently repeated doses of Dover's powder; injections of the infusion of ipecacuanha with opium, or of a weak infusion of bark and rhubarb; warm poultices over the abdomen; the use of the diaphoretic mixture already noticed; the infusion of catechu given internally or as an enema; and camphor, with ipecacuanha and opium, are often very serviceable. When there is evidence of morbid secretions and fæcal matters still remaining at this stage of the disease, a full dose of calomel and opium may be given at bed-

time, in addition to the employment of some of the above remedies, and followed early in the morning either by a full dose of the compound jalap powder taken in aromatic water, or of rhubarb and calcined magnesia. If either of those seem not to answer the purpose intended, a full dose of castor oil may be substituted for them.

Amongst the Natives of India, who are subject to the form of dysentery now under consideration, local depletions only can be attempted; and they can seldom be carried to a great extent. Purgatives are indispensable at the commencement of the disease, and should be preceded, in many cases, particularly on the invasion of disorder, by an emetic. Afterwards, the use of diaphoretics and anodyne injections will often of themselves effect a cure in the slighter cases. In the more severe attacks, the full dose of calomel and opium should be given at bed-time, and be followed early in the morning by a purgative draught and a laxative injection. When offending matters seem to be removed, we should then chiefly trust to the use of diaphoretics, anodynes, and gentle tonics. The warm bath and blisters to the abdomen are also beneficial in the course of the disease.

As the treatment of the simple dysentery must assume a somewhat modified character in long residenters in the climate from that which is requisite amongst recent comers; and as it must necessarily be more antiphlogistic in the latter than in the former, so must the modification be still greater amongst the natives of the country. Their original conformation, habit of body, and modes of life, whilst productive of a modified form of the disease, necessarily call for a varied method of cure from that which is indispensable in the European constitution. Amongst the natives of India, antiphlogistic remedies, more particularly blood-letting, can neither be carried so far, nor be so frequently repeated, as in the European residenter. In the majority of cases it is only admissible when resorted to early in the disease, in a local form, and to a very moderate extent. When the acute stage is overcome by means of a gentle antiphlogistic method of cure, consisting chiefly of purgatives, diaphoretics, and anodynes, it will generally be requisite to prescribe for them warm cardiacs and stimulants combined with laxatives and tonics.

The habits of the natives of the country should always be regarded in the treatment of the diseases to which they are liable; and in none is this object more necessary than in the cure of dysentery as it occurs in them. Their habitual use of the warm spices

of the country, and of the astringent tonics, such as catechu, betele*, &c. indicates the necessity of employing these substances, both by the mouth and in the form of enemata, and of combining these or other warm stimulants and tonics with anodynes, in the progress of the disease. Even when there is occasion to employ purgatives so as to act efficiently, which is often requisite in them as well as in Europeans, they should be given in combination with warm spices. With respect to the choice of purgatives for this class of the Indian community, little distinction from those already recommended need be made. The combination of calomel with rhubarb and powdered ginger is extremely useful. The compound jalap powder with ginger or spice, the bitter aperient mixture with tincture of cardamoms and of ginger, and castor oil, may be employed without distinction.

The only medicines of this class I object to in the treatment of dysentery are, the different preparations of colocynth and aloes. They generally tend, both with Europeans and natives, to augment the straining and tenesmus, particularly if they be frequently repeated. A similar objection may be urged against the sulphate of magnesia, if given alone; but when employed to quicken the operation of the infusion of senna, or of the infusions of senna and gentian, this objection cannot be urged against it. In many cases, however, the sulphate of soda, or the tartrate of potash and soda, will be found less objectionable.

Secondly. The *treatment in hepatic dysentery* must be conducted upon the same principles, and nearly in the same manner, as in the simple form of the disease; but with the additional indication of removing the affection of the liver, on which that of the bowels chiefly depends. In almost all cases of this complication, vascular depletions, either general or local, or both, according to the circumstances of the patient, will be required; and it will not unfrequently be found necessary to repeat the local blood-lettings during the progress of the disease, as symptoms may occur. After depletions have been decidedly instituted, and the bowels evacuated in the manner recommended, the next object is to change the morbid state of the biliary secretions, which, if they have not produced the dysenteric disorder, at least tend to perpetuate it. This condition of the bile generally arises from the inflammatory action

* The betele-nut is the produce of the *areca catechu*, and when dried is habitually chewed, with the leaf of the *piper betele*, by the natives of India. A little quick-lime is generally added to the nut and leaf. The effects of the whole are sialogogue, tonic, astringent, carminative, and exhilarating.

going on in the liver; therefore, the antiphlogistic measures thus advocated constitute the first step which ought to be adopted in order to remove it. Vascular depletions, carried to an extent compatible with the state of the patient, act beneficially, both in removing disordered action of the liver and bowels, and in preparing the system for the operation of those remedies which are to follow. Of these, the most important are the preparations of mercury, when judiciously employed.

The complicated form of dysentery is that more generally prevalent amongst the older European residenters in a warm climate, particularly in India. In them general depletions are seldom admissible; but local blood-lettings, carried as far as the state of the patient seems to require, and repeated when necessary, cannot be omitted; and when judiciously prescribed, and followed by antiphlogistic remedies and other means necessary to remove the disordered state of the bile, will be the chief agents in curing the disease.

In this form of dysentery, the exhibition of calomel internally, conjoined with opium; the inunction of the mercurial ointment, combined with camphor, on the region of the liver and abdomen; and the application of it upon the surface of the warm poultices which follow the local depletions (and which should be frequently renewed, and continued for a considerable time), are the means which are generally most efficacious in changing the morbid state of the biliary secretion. But these means should be employed early in the disease, and with much caution; for if they fail of inducing a decided effect upon the salivary glands, after they have been prescribed sufficiently long for this purpose, and are still persisted in, they may be, and indeed often are, productive of much mischief.

When treating of the simple acute dysentery, I have not mentioned the employment of the preparations of mercury with the intention of producing their specific effects upon the constitution, because I believe that these effects are not necessary to the cure of this form of the disease. The exhibition of large doses of calomel, either alone or combined with opium, have been recommended, with the view of correcting the biliary and intestinal secretions, and of preparing them, and the surfaces on which they are lodged, for the operation of the purgatives which are afterwards exhibited. If the mouth become affected after this mode of employing the remedy, the circumstance may be looked upon as favourable, especially if the secretions, stools, and other symptoms, become ameliorated about the same time. If these effects be produced without any

action upon the mouth, I nevertheless conceive that the medicine is producing an equally beneficial effect, and one less likely to depress the powers of life, which should be preserved throughout, as far as may be consistent with the speedy removal of the disease. When the affection of the liver, in the complicated dysentery now under consideration, is of that kind which seems to require the mercurial influence to be exerted upon the mouth and salivary apparatus, this influence should be speedily induced; and if this object is not accomplished within a short period, especially when sufficient vascular depletion and purging have been premised, the exhibition of mercurials ought to be laid aside.

Mercury, when given, either in simple or complicated dysentery, late in the disease, with a view of affecting the system, or when its exhibition is continued with this intention for too long a period, often seems to precipitate the malady to an unfavourable termination, by inducing or keeping up irritative fever, and by lowering the powers of life. In the advanced stages especially, the strength of the patient often sinks rapidly from the exhausting nature of the disease; and if this effect be not promoted, it certainly is not retarded by the influence of mercury upon the system, when it fails of speedily producing its derivative action upon the salivary glands. When this powerful agent is thus injudiciously employed and persisted in, the powers of life seem to have an additional enemy to the disease to contend with; and it is sometimes difficult to say which is the most instrumental in producing the unfavourable result. When blood-letting has been previously resorted to and carried to a sufficient length, then the mercurial action, if it be at all likely to be serviceable, will soon be induced; but as long as active inflammation remains, the mercurial action will not take place; irritative fever will be the consequence, and the powers of the system will be thereby exhausted.

In those cases where the symptoms have disappeared upon the supervention of the ptyalism, it often seems rather that the mercurial action is to be imputed to the previous subsidence of disease, than that it has caused this result: instead of being a cause of recovery, the mercurial influence is merely one of the first effects of a favourable change in the course of the malady. I have seen numerous cases of disease in the liver, both occurring alone and complicated with dysentery, where, after a continued and active employment of mercurials, with a view of affecting the system, their influence was produced not only upon the mouth, but also upon the

salivary glands, and yet the disease was not arrested thereby, but even ran its course more rapidly to an unfavourable termination.

In the uncomplicated form of dysentery, where inflammatory action exists in the colon, it must be reduced by previous depletions, and the morbid secretions lining the internal surface of the intestines removed by purgatives, before the mercurial action can be produced; and when these preliminary objects are attained, what further effect is to be desired from inducing the constitutional influence of mercury? The most frequent consequence following upon the induction of this influence is a protracted recovery, from the diminished energy of the powers of life, occasioned more by the mercurial action than by the disease. When the effect of mercury upon the system rapidly supervenes, we are disposed to view it entirely as resulting from a mild form of disease, the local inflammatory action and attendant fever being insufficient to counteract the influence of this medicine upon the constitution.

In the complication of dysentery, however, with hepatic disease, the case is different. Here there is generally a morbid secretion of bile, either accompanied with, or independent of, organic disease of the biliary organs; and the object of the practitioner is to remove irritating matters from the *prima via*, as well as to correct the morbid secretions and functions of the liver. In order to accomplish these ends, mercurial preparations must be employed in such a way as shall the least disturb the energies of the digestive organs, and of the frame generally. The exhibition of scruple doses of calomel at bed-time, followed by a purgative in the morning, is the most likely to fulfil these objects; it tends to improve the state of the intestinal secretions as well as those proceeding from the liver; and if the functions of this organ be either torpid or vitiated, it tends more decidedly to promote secretion, and to restore it to a healthy condition, than any other mode of employing this remedy, or any other measure with which I am acquainted; and in the event of inflammatory action or abscess existing in the liver, or still remaining after the more acute symptoms have been subdued, it is more unequivocally beneficial than the usual modes of employing the medicine.

When the disease of the liver which is associated with dysentery, owing to its character or obstinacy, seems to require the induction of the mercurial action, then decided measures should be employed to accomplish it; but, these measures should not be continued much beyond the period within which this action is usually produced, lest the powers of life be injured thereby, irritative fever with irrita-

bility of the bowels be promoted, and the morbid action of the liver be heightened instead of being reduced by them. When abscess seems to be forming, or has already formed, in the liver, the use of mercurials, with a view of inducing their appropriate action, is generally hurtful; and this effect seldom, or at least rarely, is produced by them.

Having thus stated my views as to the operation of mercurial remedies, and the advantages which may be expected from them in this form of disease, there remains but little to remark respecting the other means of cure which may be employed in it, as they differ in nothing from what has been already expressed with a stricter reference to the simple and uncomplicated form of the disease. The use of antimonial diaphoretics seems, however, to be more advantageous in the hepatic than in the simple dysentery; whilst ipecacuanha in conjunction with opium is more beneficial in the latter. When the bile is irritating, crude, and apparently inspissated, large doses of the tartrate and supertartrate of potash, or of the soda tartarizata, are extremely beneficial, especially when combined with gentle doses of antimony and the sp. æther. nitr. In this form of the disease, tonics and astringents are oftener prejudicial than productive of advantage; and opium, unless when combined with calomel, camphor, or diaphoretics, is not so decidedly beneficial, when given in large doses, as in the simple acute dysentery, excepting, indeed, when prescribed in the above combinations after depletions.

Dysentery supervening in the progress of fevers is merely a symptom of those diseases; and its treatment, when occurring under such circumstances, will be noticed when fevers are treated of. When it appears in the course of convalescence from them, it generally is induced by some error of diet and regimen, or exposure to some of the external causes which have been already enumerated. When it occurs after remittent and intermittent fevers, the existence of disease of the liver and spleen may be suspected, and the state and functions of these viscera should be carefully inquired into. If the functions of the liver are deranged, or this organ affected in its structure so as to give rise to the symptoms indicating such affection, the treatment recommended under such circumstances must be adopted. The speedy induction of ptyalism, after the method already commenced, if it take place, will generally be advantageous; but if the mercurial remedies fail of producing this effect, after a judicious exhibition of them, they should be laid aside. When they succeed in procuring healthy secretions and

copious evacuations, even although the mouth should not be affected, we ought to be satisfied; for, endeavours to excite ptyalism by too frequent and too long an exhibition of mercury, are generally most pernicious. I have seen ulcerated gums, aggravation of all the symptoms, and loss of strength, result from persistence in the endeavours to induce ptyalism, the object being unattainable, until the patient was endangered more by the remedy than by the disease. Ptyalism, therefore, should not be made the object of a mercurial treatment in dysentery, but be viewed, when it does occur, as a satisfactory indication of the beneficial operation of this treatment, and of the removal of the disease.

The circumstance of dysentery having supervened upon fever should not prevent us from having recourse to local depletions, if the patient complains of severe tormina and tenesmus, or of pain, soreness, or a sense of heat, in the regions of the cæcum, colon, or liver. If the biliary organs be implicated in the disease, such depletions are still the more requisite, and will promote the action of mercurial medicines upon the salivary glands if this effect be desired. Even a repetition of the local depletions will be sometimes required, and followed by a decidedly beneficial result.

The employment of purgatives, especially early in the attack, is also necessary; and the more so, as the disorder is generally produced in consequence of error of diet, and a too great indulgence of the appetite, which is often much increased upon convalescence from fevers. In addition to local depletions and purgatives, calomel with opium, and sudorifics or diaphoretics, should be administered; and the different means already mentioned put in practice, according as the disease may present a simple or complicated aspect: of these the warm bath, emollient and anodyne enemata, and blisters, claim a particular notice.

When dysentery occurs after continued fever, it proceeds from the extension of irritation or inflammatory action of the mucous surface of the stomach and small intestines, which is generally present in fevers, to the large bowels; and my practice has been founded upon this view. In cases of this description, the means of cure are precisely those already noticed. It should, however, be kept in recollection, that dysentery, when occurring after acute disease, is more apt to terminate rapidly in some one of those structural changes described in the foregoing section, more especially in ulceration; and a decided and judicious plan of cure is the more requisite under these circumstances. Local blood-letting is often indispensable in these cases, but it ought to be early employed. Purga-

tives, laxatives, and emollient injections, are also requisite in order to carry off the morbid secretions and accumulated matters in the *prima via;* and much advantage will be obtained from diaphoretics combined with anodynes, and from external irritants.

I shall now direct the attention of the reader to the management of particular states of disease which frequently arise in the course of the forms of dysentery already described. Amongst these the most frequent is *tenesmus.* I have generally looked upon this as a local symptom, and as depending upon inflammation or irritation of the rectum; and, conformably to this view, have always prescribed the application of leeches along the sacrum, or to the perinæum and anus, and the injection of small emollient and anodyne enemata. When *excoriations* take place about the anus, particularly if there be much pain and inflammation, the application of a few leeches is generally beneficial, especially when followed by fomentations and poultices. In these cases, particularly if the bowels have been evacuated, and accumulated fæces and secretions carried off, the injection of a small emollient and anodyne enema, immediately previous to the employment of those latter means, is extremely serviceable. In cases of hepatic dysentery, excoriations about the anus are very frequent; and, as being not so often accompanied with the retention of fæcal accumulations as they are in simple dysentery, especially at the period of the disease when excoriations supervene, this local treatment is generally more beneficial in the complicated malady than in its simple form. After the application of leeches, lotions with opium, and astringents, are often serviceable, and ointments with opium and a little of the sulphate of zinc, or the cerussæ acetatis.

Prolapsus ani is a very troublesome symptom in dysentery, and indicates very active disease of the rectum and sigmoid flexure of the colon. Here, also, the application of two or three leeches will be beneficial, particularly when followed by astringent fomentations. The use of a warm wash, consisting of a decoction of bark to which opium has been added, and a careful replacement of the protruded bowel, are generally requisite. When the prolapsed part of the rectum is ulcerated, astringent lotions are often beneficial; and these may be alternated with the use of the common black wash. In cases of this description, anodyne and mucilaginous enemata are necessary, at the same time that cooling aperients, combined with antispasmodics, are required to carry off the morbid secretions, which either occasion or keep up the irritation in the bowels. The employment of antispasmodics, particularly opium, hyoscyamus,

and conium, in combination with laxatives, is extremely serviceable in taking off, or relieving, that state of spasm or increased action of the muscular coats of the bowel generally connected with, if not altogether occasioning, the *prolapsus*.

The inflammatory irritation and inordinate action existing in the large bowels and rectum are generally the causes of considerable pain above the pubes, *dysuria*, and frequent calls to void the urine which accompany the dysenteric disease, especially in its simple and acute form. In the latter stages, when inflammation has extended to the more external coats of the bowel, the bladder itself becomes affected, chiefly at its mouth and in the vicinity of the prostate gland; and if the urine be, as indeed it usually is, of a more than usually acrid and stimulating nature, the frequency of the calls to pass it, and the degree of irritation and spasm thereby occasioned, are often distressing. For these symptoms, solutions of gum arabic, injections *per anum* of mucilaginous substances, and anodynes, are indispensable. Where the urine seems to be retained, from spasm, about the neck of the bladder, I have frequently given the tinct. ferri muriat., but have often failed in deriving advantage from it until nausea was induced.

Much benefit seems to result from the use of the carbonates of the fixed alkalies, particularly the soda, given with mucilage and opium or hyoscyamus. The practitioner should always be aware that retention of urine may supervene in the advanced stages of dysentery, and that if it be not either prevented, or speedily remedied, the dysenteric disease and general febrile action will be greatly increased by the circumstance. Local depletions, followed by the warm bath or the hip-bath, or local fomentations and emollient and anodyne injections, are all calculated to remove this symptom, whilst they tend, in no equivocal manner, to alleviate the original state of disease. Small injections, which do not distend the bowel so much as to occasion re-action of its muscular coats, are here particularly serviceable. They should not exceed two or three ounces in quantity, and ought to be frequently employed. When the symptom seems to proceed more from spasm than inflammatory action, the tinct. ferri muriat. often succeeds better than almost any thing else; but when the strength of the patient is not very much reduced, and there is evidently inflammatory irritation existing, local depletion, especially from the perinæum, and the other means just now enumerated, ought to be put in practice.

Flatulence is another distressing symptom in this disease, often requiring particular attention. It is most appropriately treated by

means of any carminative or antispasmodic medicine combined with the laxatives, or purgatives prescribed. About half an ounce of the ol. terebinth. added to the laxative injections usually employed in the disease, more completely removes this symptom than any other means which can be used.

Dysenteric disease is sometimes preceded by *hæmorrhoids*, or rather, dysentery sometimes attacks individuals subject to this affection; and frequently the dysentery which seizes those persons is associated with functional or organic disease of the liver. When this complication is met with in practice, the sufferings of the patient are generally considerably aggravated, but the difficulty of treatment is not proportionally increased; for the same means which are required to remove the dysenteric disease, and any affection of the liver which may be present, are also sufficient, in the majority of instances, to cure the hæmorrhoidal affection. The loss of blood from the hæmorrhoidal vessels, the prolapsus of the tumours when at stool, and the strangulation of them when the spasm of the sphincter or lower circular fibres of the rectum is great, frequently alarms the patient, as well as augments his sufferings. In cases of this description, the application of leeches to the perinæum and around the anus, and sometimes to the hæmorrhoidal tumours themselves, fomentations, warm bath, &c., are beneficial, and should be accompanied with small anodyne injections. Local depletion over the sacrum is here also of considerable service, particularly when followed by cooling purgatives and diaphoretics. When the hæmorrhoidal affection seems to depend upon interrupted circulation in the *vena portæ*, mercurial remedies, exhibited so as to excite the action of the liver and remove obstruction, should be conjoined with the foregoing remedies. In cases of this description, the blue-pill, or hydrarg. cum cretâ, given at bed-time, with an equal quantity of Dover's powder, are extremely beneficial, especially when aided by about three drachms of the supertartrate of potash, with one of the sulph. precip. the following morning in honey or syrup.

In some cases, *abscess* forms in the vicinity of the anus, and is generally seated in the loose cellular tissue connecting the bowel to the surrounding parts. If local depletions fail of preventing the formation of matter in this situation, means should be used to bring the abscess to maturity, and an early and large external opening should be made, in order to prevent a fistulous state of the parts from supervening. Frequent ablutions, fomentations, and injections, are here requisite, in order to remove every source of irritation which may be present.

Having thus stated my views respecting the treatment which appears to me to be the most advantageous in the simple acute dysentery and in the complicated form of the disease, I proceed to offer some observations upon those remedies which have not been particularly noticed, in consequence of their being, in the great majority of cases, not essentially requisite in the treatment of this disease, although often necessary, especially for certain states and stages of the malady.

The use of the *dilute nitric acid*, both exhibited alone and in combination with opium, has received the sanction of many practitioners in India. Sir James M^c^ Grigor, in his paper upon the diseases of the 88th regiment, while stationed at Bombay, published in the first volume of the Edinburgh Medical Journal, speaks of the nitric acid in favourable terms in this disease, when given to as great an extent internally as it could well be used, employing it at the same time externally. When the disorder is attended with disease of the liver and a depraved secretion of bile, this acid is often serviceable. I have generally found it most so after mercurial remedies have been used, and when the disease had assumed a chronic or sub-acute character; but I have always preferred, externally, the nitro-muriatic acid solution, in the form of a tepid wash to the abdomen; whilst the nitric acid was prescribed in the usual drink of the patient.

The nitric acid, when combined with opium, is still more beneficial than when given alone, especially when the disease is limited to the intestinal canal. When exhibited internally at the same time that the nitro-muriatic acid solution is employed externally, considerable advantages will be derived from it. Care should, however, be taken not to prescribe it internally when other remedies are exhibited with which it may form irritating and hurtful combinations in the *prima via*.

The advantages derivable from the combination of opium with an acid are not limited to the nitric acid. Combined with either the muriatic, or the citric, or the acetic acid, opium is productive of much benefit in many of the forms of dysentery. In order to be beneficial, they should be resorted to after evacuations have been instituted, and the large bowels unloaded of whatever fæcal matters may have been lodged in them; and, as fæcal accumulations are apt to form in the course of the disease, when the use of purgatives is neglected, care should be taken to evacuate fully the intestinal canal, from time to time, during the employment of these or similar means, especially such as are of an astringent nature.

The *decoctions or infusions of the cinchona bark*, either alone or in conjunction with the *infusion of rhubarb*, have been much employed in the dysentery of temperate climates, especially in the latter stages of the disease. As long as there is evidence of active inflammation being still present in the large bowels or in the liver, and whilst fæcal matters are still remaining in these viscera, the infusions of bark and rhubarb are seldom beneficial; but, on the contrary, are often detrimental, unless when employed in the form of an injection. When, however, exhaustion supervenes, and the disease of the colon seems to be of a sub-acute or erythematic kind, with deficient power in the mucous textures and in the capillary vessels generally, as indicated by softness of pulse, aphthous state of the mouth, excoriated condition of the anus, and tympanitic or relaxed condition of the abdomen, with clamminess of the skin, mouth, and tongue,—the administration of the infusions of cinchona and rhubarb, both by the mouth and anus, is extremely beneficial. Whether prescribed in the form of infusion or decoction, they may be also made the vehicle for other medicines, either of a purgative or anodyne nature, according to the particular circumstances of the case.

Amongst the natives of India, these infusions, combined with the tincture of catechu and tincture of ginger, are extremely beneficial, whether given by the mouth or in the form of enema. The remarks respecting the bark apply equally to the infusion of columba, which, when combined especially with the liq. ammon. acet. may be exhibited under circumstances which might render the use of cinchona a matter of doubtful propriety.

Camphor has been much recommended in the dysentery of temperate climates. It is most useful in conjunction with other remedies, given in repeated doses, and in combination with anodynes and laxatives. When taken suspended in mucilage, after vascular depletions and copious alvine evacuations have been prescribed, it is a truly excellent medicine. But its use need not be limited to any stage of the disease, for it generally possesses the advantage of determining to the skin, and of diminishing vascular action, when given in moderate doses, and it diminishes spasm without retarding the operation of purgative or laxative medicines. The dose of this substance should not exceed two or three grains early in the disease; and it may be increased to five or six in the advanced stages. It is very advantageous combined with mucilaginous enemata; and when assiduously rubbed, in conjunction with the mercurial ointment, upon the abdomen and hepatic region, in the complicated

and chronic forms of the disease, it is generally productive of benefit, beyond what is usually derived from the inunction of the mercurial ointment alone.

Mucilages have been much recommended in the various forms of this disease. As adjuvants merely, or as vehicles for other remedies, they are extremely beneficial. The mucilages, especially gum arabic and tragacanth, may be also given in the patient's drink with considerable benefit, particularly when he complains of *ardor urinæ* or *dysuria*. But they are soon disrelished if not combined with some other substance which can impart a more agreeable taste to the beverage than mucilages. For this purpose, lime-juice, the nitric acid, cream of tartar, &c., may be employed. Beyond producing a soothing effect upon the urinary organs, the mucilages have little effect upon the large bowels when given by the mouth. If irritation, however, exist in the small intestines a free use of them is attended with advantage; but they are generally digested before they reach the colon, and they often seem to dispose to acidity in the stomach and bowels. This latter effect, however, may be counteracted by exhibiting the sub-carbonates of the alkalies or magnesia in conjunction with them.

It is chiefly in the form of injections that the most beneficial results proceed from the use of mucilaginous substances. When administered in this manner, they come in immediate contact with the seat of disease, soothe the irritable surface of the bowels, sheathe them from the effects of the morbid secretions, and, when they are the vehicle of other remedies, they are the means of prolonging their influence upon the diseased organ. Employed in this way, in conjunction with camphor and anodynes, they are extremely beneficial, especially in the progress and advanced stages of the disease.

Ipecacuanha, besides being given in the form of Dover's powder, is frequently exhibited in the form of infusion, as an enema, with considerable advantage. I have derived much benefit from it, after vascular depletions and alvine evacuations have been instituted. It is also beneficially combined with calomel, or the other mercurial preparations, and with opium, in doses of from one to three grains, taken twice or thrice daily. Some practitioners in India have recommended this medicine in as large doses as from thirty to sixty grains, with as many drops of laudanum. When this practice is adopted in the commencement of the slighter cases, it frequently is followed by benefit, producing at first vomiting, and afterwards free alvine evacuations. In the more severe cases, but little advantage is derived from it beyond its action as an ipecacuanha emetic. The stomach, in such cases, seldom can bear more than a single grain

for a dose, and then the form of Dover's powder, or its combination with opium and the mercurial preparations, is most beneficial. A large injection of the infusion is often followed by sickness and retching; and when these effects are attended with a free evacuation of the bowels at the same time, as they frequently are, much advantage is derived from the practice. This injection may be also advantageously made the vehicle for anodyne medicines, as laudanum, and the extracts of hyoscyamus and conium.

The injection of *lime-water with calomel*, in the form of the black wash, is often very beneficial in the last stages of the disease, when evidences of ulceration or of sloughing of the mucous coat of the rectum or colon are present, or when, with appearances of excoriation of the bowel, there is much depression of the powers of life. In these cases, a considerable portion of mucilage should be added to the lime-water, as tending very materially to prolong the effects of the enema. Under similar circumstances, also, the employment of the infusions of columba, catechu, rhubarb, and cinchona bark, are requisite, both exhibited by the mouth and as injections.

The *nitro-muriatic* solution should be resorted to in this disease, especially in the hepatic complication of it, as recommended when treating of the diseases of the liver. A cloth wet with the solution spread over the abdomen, and covered by warm poultices, the whole being frequently renewed, and the patient kept as much as possible in the horizontal posture, is a very advantageous manner of resorting to this remedy; or the poultice may be made of the acid solution. It is, however, in the chronic form of the disease that the nitro-muratic solution is most beneficial. As an enema in cases of ulcerated bowel, it is an admirable remedy.

In respect of the *diet* and *regimen* of the patient, it may be remarked, that farinaceous food of a light description, such as sago, arrow-root, tapioca, rice, and soaked biscuits, are the most beneficial. In the advanced stages, a little wine may be added to these, especially in the cases of those who have been in the habit of using spirituous and intoxicating liquors. Broths, especially when rich and containing much animal matter, are extremely productive, in the advanced stage of the disease (the only period at which they are much required), of acidity in the *prima via*, and increase the frequency of the calls to stool.

The patient should always have a flannel shirt next his skin, or a flannel bandage or large shawl wrapped around the abdomen and loins; and he ought to be kept as much as possible in the horizontal posture, and be protected from currents of air, particularly during the night.

SECT. VI.—*On Chronic Dysentery and Chronic Diarrhœa.*

Chronic dysentery and chronic diarrhœa appear to depend upon the same pathological state of the intestinal canal, and to differ merely in degree, and in the more or less complete limitation of disorder to particular parts of the bowels. In the former the large bowels are the seat of the disease, whilst in the latter, the mucous coat and follicles of the small intestines seem to be chiefly affected. An attentive observation of the phenomena of these diseases during the life of the patient, and a careful examination of the appearances after death, have led to the adoption of this view of the seat of the disorder. As to its nature, however, much greater doubt may arise. Some may consider those affections to be essentially inflammatory, the vascular action being of a less active character than in the acute form of dysentery; whilst others may view them as resulting from deficient tone of the extreme vessels, accompanied with a morbid state of the secretions poured out upon the mucous surface, irritating the bowel and exciting it to increased action.

The *symptoms* of chronic dysentery are nearly those which have been already described as characterising the acute disease, except that they are much diminished in severity, but of longer duration. The tormina are either entirely wanting, or present in a slight degree, and the tenesmus is also less urgent. The stools are generally more or less serous, mucous, muco-purulent, and gelatinous, containing fluid, feculent matter, and substances varying in colour from a white, albuminous appearance, resembling the white of an egg, to a dark olive-green or greenish black. Sometimes they are variegated or marbled, and occasionally one day seeming like chalk and water, and on another, like a dark-coloured jelly, or the green fat of a turtle. Blood is often seen in the stools, more or less intimately mixed with the evacuation, sometimes so closely incorporated with it as to give it a uniform brick-red appearance; at other times the blood is quite distinct, forming either one coagulum, or a fluid discharge, separate from the rest of the motion. A similar remark may be made in respect of the existence of purulent or muco-purulent matter. In some cases this matter is evident in the evacuations, in the form of small distinct streaks; whilst in many others, no such appearance can be detected, even although ulceration of the colon is undoubtedly present. The alvine discharges are generally more copious than in acute dysentery, but the calls to evacuation much less frequent. The pulse is various. In the

morning it is often but little accelerated, but its frequency generally becomes increased towards evening; and as the disease advances, it usually possesses more or less of the hectic character. The tongue is generally disordered, and the patient complains of uneasiness, or griping, or pain in the abdomen, especially in the course of the colon. But these latter symptoms vary in particular cases; the emaciation, loss of strength, tenesmus, morbid state of the alvine functions and discharges, and hectic symptoms, being the most uniform signs of disease.

Chronic dysentery is generally the consequence of the acute form of the disease, of repeated attacks of common diarrhœa or cholera, and of fevers which have been neglected in their early stages, or improperly treated. Sometimes it supervenes primarily, but this is a comparatively rare occurrence; and on some occasions the disease is mild, and continues in this form for a considerable time, unexpectedly assuming the acute character.

Chronic Diarrhœa, in many of its symptoms and morbid relations, closely resembles chronic dysentery. It is usually observed, after acute dysentery, or in consequence of repeated attacks of this disease; it also often follows upon frequent attacks of bilious diarrhœa, or of cholera. It is chiefly owing to the absence of tenesmus, tormina, bloody stools, and of fever, that it is distinguished from chronic dysentery. As to the frequency of the evacuations, and their general appearances, excepting the admixture of blood evidently possessing the characters of this fluid, both diseases are nearly alike.

Chronic diarrhœa and chronic dysentery may be associated with disease of the liver, in which case the affection of the liver is usually also of a slow or chronic nature, and most frequently implicating the internal structure of that viscus. When this complication exists, it is evinced by those symptoms described when treating of the diseases of the liver. Amongst these symptoms, a dark green appearance of the evacuations, indicating a morbid state of the bile; or a pale clay colour, showing a torpid state of the liver, or obstruction of the biliary ducts; a dirty, watery, and offensive state of the stools; a pearly appearance of the eye; oppression or tightness at the epigastrium and lower part of the thorax; and sallow, muddy state of the countenance; with slight evening exacerbations of fever, and increased frequency of the calls to stool, are the most constant and prominent. This complication of disease, when present in the chronic as well as in the acute form, occurs generally amongst those who have resided for some time in a warm climate.

Chronic diarrhœa and dysentery are also frequently observed supervening to the different form of fevers which are met with in warm climates, especially in low and marshy situations, and where the advantages of good water are not enjoyed.

When either chronic dysentery or diarrhœa is associated with lesion of the liver, the morbid secretions of this viscus may be justly viewed as being the cause of the bowel disease. In some cases the absence of bile, as evinced by the state of the evacuations, seems to have no small share in either producing or perpetuating the bowel affection. It seems as if a due secretion of bile, and the retention of it for a time in the gall-bladder, in order to undergo certain changes, were absolutely requisite, not only to the due performance of the digestive functions, but also to the preservation of a healthy state of the mucous surface of the bowels, and of the follicular apparatus and vessels distributed to it.

When the biliary secretion is not of that kind which is necessary to the change of chyme to healthy chyle, the alimentary matters form unnatural and unhealthy combinations, which, during their passage along the alimentary tube, irritate the sensible mucous surface, and increase both the capillary exhalation of this structure, and the secreting function of the follicular glands: and when, owing to the peculiar conformation of the cæcum and colon, these matters are retained, in conjunction with the disordered biliary secretion, in these bowels for any time, disorder is not only induced, but perpetuated in those situations, until the organic changes, observed upon the examination of fatal cases, are at last produced.

It is chiefly owing to obstruction of the biliary secretions, to the consequently deranged function of chylifaction, and to the diminished absorption of the alimentary matters, from their imperfect preparation for the wants of the economy, together with the increased and morbid secretions proceeding from the follicular glands and mucous surface, that the stools present the aspect which has given rise to the appellation of "*white flux*." In cases of this description, the evacuations have the appearance of chalk or lime, mixed in a foul or turbid fluid; sometimes they have an intermediate character between this and the whites of eggs, and occasionally they resemble cream or yeast; they are often slimy, or with broken-down clay-coloured fæces mixed in the above whitish fluids. Evacuations of this kind often continue for a considerable time: in some cases they change to a darker colour, and afterwards return to the same white appearance. This is seemingly owing to the medicines exhibited, or to an occasional discharge of bile pre-

viously obstructed, which, by its admixture with the morbid intestinal secretions, gives them a dark colour.

When chronic dysentery or diarrhœa terminates fatally, this result is generally occasioned by ulceration, the ulcers having perforated the large or small intestines, and the contents of this viscera being effused into the peritoneal cavity. Not unfrequently the colon, at some part or parts of its course, becomes permanently constricted, in consequence of the continuance of chronic inflammation, generally at first accompanied by spasmodic constriction of the inflamed part, the spasmodic contraction becoming at last permanent, from the change induced by the inflammatory action in the structure of the part constricted. When strictures of the colon exist to an extent sufficient to prevent the passage of the fæcal matters, then the part of the bowel above the constriction necessarily becomes distended so far as to interrupt the functions of the adjoining viscera, and even to occasion rupture of the coats of the distended part, the rupture generally taking place in the situation of an ulceration, if ulceration exists. When the distension of the colon, proceeding from constriction about the left arch or sigmoid flexure of the bowel, is followed by a fatal result, without rupture of the distended part, it is not owing so much to the mechanical effects of the continued distension upon the bowel itself and upon adjoining viscera, as to the retention of excrementitious matters in the circulation, that death is induced. Doubtless, the distended colon impedes the descent of the diaphragm, disorders the functions of circulation and respiration, causes congestion and effusion, both in the thorax and in the head, and deranges the functions of the liver, stomach, and small bowels, as well as those of the kidneys; but during the long retention of fæcal matters in the *prima via*, in consequence of the mechanical impediment in the way of their discharge, a large portion of them is absorbed into the circulation, and thus destroys life by vitiating the source whence it is perpetuated.

In the chronic forms of dysentery, the functions of the kidneys and urinary organs are often not materially affected: in some cases, however, these organs are considerably disordered, more especially those of the bladder. In the acute forms of dysentery, the functions of the kidneys themselves are occasionally very much deranged; suppression of urine being sometimes present, owing to the extension of inflammation from the descending colon to the left kidney on one side, and from the right lobe of the liver to the right kidney on the other; but this is seldom observed, except in the com-

plication of acute disease of the liver with acute inflammatory disorder of the colon: in the complications of chronic disease of these viscera, suppression of urine is rarely observed, though *dysuria* and *stranguria* sometimes occur.

Although both chronic dysentery and chronic diarrhœa are occasionally met with in simple or uncomplicated forms, and even terminate fatally, without any appearances of disease being detected in the liver, yet such complications are much more frequent than simple forms of these diseases; and not only is disease of the liver associated with organic changes in the large and small intestines, but the mesenteric glands, pancreas, spleen, and omentum, frequently also present signs of altered structure.

When the diseases now under consideration follow upon any of the various types of fever endemic to India, the associated organs of digestion, especially the liver, pancreas, spleen, and mesenteric glands, seldom are found in a sound or natural state. It is not meant to say that all these viscera present appearances of disease in the same case, although on some occasions two or more of them are changed in structure; but that some one of them is generally diseased, as well as the large and small intestines. In cases of this kind, the disease of the collatitious viscera, as well as that of the bowels, may have been consecutive upon the febrile disorder, or at least upon repeated attacks of fever, owing to the particular circumstances connected with the patient during its continuance, or during convalescence from it, and to the nature of the causes producing and perpetuating disease. Thus, during a severe or protracted attack of fever arising from terrestrial exhalations, vicissitudes of temperature, fatigue, and irregular living, the liver, pancreas and spleen, not unfrequently become disordered in function, and sometimes also diseased in structure. To this state sometimes is also conjoined a morbid condition of the bowels, assuming either the form of dysentery, or chronic diarrhœa, which frequently becomes the prominent affection, exhausts the system, and deranges the functions of all the vital organs. Such a sequence of morbid action is often met with amongst Europeans in warm climates, and especially in soldiers during the fatigues and exposures of an active campaign.

The symptoms indicating a favourable or unfavourable termination, are altogether similar to those instanced in a previous section. As to the appearances, however, which most frequently present themselves upon the examination of fatal cases of this form of disease, it will be necessary to make some additions to what has

been stated, with a stricter reference to the acute and sub-acute forms of dysentery. The omentum is sometimes thickened, corrugated, drawn up to the colon, or to one side: it is not unfrequently adherent to some part of the bowels, or to the brim of the pelvis, and occasionally to both. The stomach and small intestines are generally much distended with an offensive gas: more rarely the small intestines are irregularly constricted and thickened in their coats; and I have even found extensive intus-susceptions in various parts of the ileum. With respect to their colour externally, they are generally very similar to that already described as belonging to the acute disease. Occasionally, firm and cellular adhesions connect the external surface of the small intestines to the omentum, or to the cæcum or colon, or even one convolution of them to another, forming a hard mass or tumour which has occasionally been mistaken for an enlargement of the liver. The cæcum generally presents decided appearances of disease externally, but its internal structure is most extensively deranged: it is frequently distended with flatus, its coats thickened, its peritoneal surface covered in parts with coagulated lymph, and the cellular substance connecting it to the abdominal parietes inflamed, thickened, and easily lacerated. The colon is frequently distended in one part and contracted in another; but it sometimes is found very much enlarged and distended throughout, and devoid of its usual divisions into cells or compartments. Coagulable lymph is often seen on its surface, firmly uniting one part of it to another, and to the adjoining viscera, especially to the liver, stomach, spleen, &c. This is most frequently observed when ulcerations have nearly perforated all the tunics of the bowel, and the inflammation proceeded to its peritoneal covering.

Occasionally, when adhesions have taken place between adjoining parts of the peritoneum covering these viscera, or when the internal ulcerations have proceeded so far as to have induced peritonitis, and the patient has lived some time afterwards, the peritoneum presents appearances of chronic inflammation throughout a greater or less extent of surface, it being greatly thickened, more vascular, and the adhesions firm and organised.

The internal surface of the bowels generally presents the most constant and most extensive lesions. The coats of the small intestines are often tumid and thickened, especially the mucous and sub-mucous tunics, with ulcerations in every stage of their progress. Accompanying this state, there are also observed, more or less, signs of inflammatory action, either in the seat of the ulcera-

tions or in the spaces between them. The ulcers, in chronic diarrhœa, generally commence in the follicular glands, and are most numerous in the ileum, particularly in the lower parts of it. The mucous surface surrounding the ulcerations is often thickened, elevated, and of a deeper colour than natural. Sometimes the ulcers are small, numerous, and agglomerated in patches, conformably to the disposition of the follicles of the intestines: at other times, and in different parts of the bowel, the ulcers are large, distinct, few in number, and placed distantly from each other. Occasionally the surrounding texture is pale, and the edges of the ulcers thin and soft; frequently they are elevated upon thickened bases, and their edges prominent and rounded.

Ulceration is seldom met with in the small intestines, even in chronic diarrhœa unattended with the characteristic symptoms of dysentery, without extensive ulceration being also present in the cæcum or sigmoid flexure of the colon. When the dysenteric symptoms have been present, the disease of the rectum, colon, and cæcum, is generally very manifest, and usually consists of ulcerations similar to those now enumerated, and to those described in the section on the appearances after the more active forms of the malady. Conjoined with ulceration, a contracted state of the bowels, particularly of the colon, at its left and sigmoid flexures, is generally present; and the parietes of the intestinal canal, sometimes of the small intestines, and almost always of the large bowels, are more or less thickened. Occasionally, the coats of the colon, rectum, and cæcum, are not only thickened and internally ulcerated, but also much indurated, and converted into a gristly or semi-cartilaginous state, and generally of a very dark hue, evidently owing to the long-continued irritation and inflammatory action kept up in the part, sometimes from the nature of the disease and peculiarity of constitution, and occasionally from inappropriate treatment.

The indurated and thickened state of the coats of the intestines is a very evident result of slow inflammatory action, especially as those states are generally either associated with ulcerations of a chronic kind, or with considerable contraction of the calibre of the bowel at the part thus changed in its organisation. Although not so lacerable as in those cases which have terminated fatally, the coats of the diseased intestines are generally more easily torn than in the healthy state, unless when they are of the gristly hardness already noticed.

Constriction of a part or parts of the colon, most frequently of the left arch, descending colon, and sigmoid flexure, are amongst the most constant appearances observed upon examinations after

death from the chronic forms of the disease now before us. These constrictions may be few or they may be many,—they are often of limited extent, resembling the ligature made by a cord, and frequently embrace a large portion of the bowel. They are generally accompanied with ulceration and thickening of the internal tunics of the intestine, but not uniformly so; and they usually present signs, either internally or externally, or both, of inflammatory action.

These strictures are, from their situation, beyond the reach of art, and little more can be done than to keep the contents of the bowels in a fluid state when we have reason to believe that they exist. But strictures also take place as a consequence of the various forms of dysentery and diarrhœa, between the sigmoid flexure of the colon and rectum, and in the rectum itself. It is chiefly to constrictions in this latter situation that attention has been directed by writers; and the idea that they are limited to the lower parts of the large bowel has been too generally entertained. A knowledge of the frequent occurrence of strictures in various parts of the colon, is of the utmost consequence in practice; and the frequent association of stricture of this bowel with that of the rectum is equally important, inasmuch as it teaches us not to confine our methods of cure to the rectum itself, but to extend them to the large bowels generally, as far as this end can be accomplished by means of gentle laxatives and emollient enemata.

I believe that stricture of the rectum is not so prevalent a complaint as is generally supposed. As respects the comparative frequency of this lesion in the rectum and colon amongst Europeans in India, I may state my belief that the descending colon is much oftener affected than the rectum, and I am much inclined to believe that this fruitful cause of disease is to be found in European climates as well as in India. The same equally obtains in England. Indeed, I am convinced, that strictures of the colon often occur, especially in the sedentary, both male and female, particularly the latter, without being the consequence of acute dysentery, and occasion various disorders and symptoms, which have been too frequently looked upon as merely nervous, and as complications which puzzle the physician.

Contractions of the colon may also be viewed as the result of repeated attacks of disease of the bowels, or of a single attack which had been protracted beyond the usual duration of the acute disorder, and degenerated into the form of chronic diarrhœa. In those cases wherein the contractions are extensive, and the bowel reduced much

in its calibre, the small intestines and cæcum, in addition to an inordinate state of distension, are generally inflamed and ulcerated in their internal surfaces; and occasionally the liver and pancreas also betray signs of disease.

In those cases of chronic diarrhœa and chronic dysentery proceeding from attacks of fever and disease of the liver, the small intestines are seldom or ever free from morbid appearances, generally consisting of ulceration and inflammation, with thickening of their tunics. When the chronic disease is chiefly the result of acute dysentery, structural changes are generally more completely confined to the cæcum, colon, and rectum.

In a very large majority of the cases I have inspected, the mesenteric glands have generally been enlarged, hardened, and apparently infiltrated with a sero-purulent matter. The mesentery has also presented, in some cases, appearances of inflammatory action in its surface. And almost in every case, the vessels running between the peritoneal duplicatures forming the mesentery have been large and injected with blood, evidently evincing increased determination of blood to the seats of disease, in its chronic as well as in its acute forms.

Chronic dysentery, as well as chronic diarrhœa, are met with amongst the natives of India, although not so frequently as amongst the Europeans resident in the country. Amongst them these disorders present more decidedly the characters of a gleety discharge from the bowels, and are more evidently the result of deficient tone in the vessels and follicular glands of the digestive mucous surface, whilst the inflammatory character of these complaints is most prominent in the European constitution.

Upon examination after death from these maladies, amongst the natives, the bowels are generally soft, flaccid, of a pale colour, excepting in a few parts of their internal surface: the follicular glands much enlarged, ulcerated, or of a dirty, sloughy appearance, and the coats of the intestines seldom thickened, although sometimes constricted in their diameters. The cæcum and sigmoid flexure of the colon are, as in Europeans, the parts most deranged in structure, and are often easily torn. The liver is seldom diseased, the spleen sometimes is much softened, and the pancreas and mesenteric glands much enlarged.

Sect. VII.—*On the Treatment of Chronic Dysentery and Chronic Diarrhœa.*

When the dysenteric symptoms continuing after an acute attack of the disease consist chiefly of an increased frequency of evacu-

tion, without straining or tormina, the appetite, pulse, and strength, improving or remaining unimpaired, medicines possessed of an astringent effect should not be employed. The evacuations ought to be viewed, in such cases, as being the mode which nature adopts of bringing about a resolution of the inflamed and tumefied state of the mucous surface, constituting an essential part of the dysenteric disease; the increased secretion and exhalation giving rise to this form of diarrhœa, emptying the engorged vessels, and removing the tumefaction of the diseased viscera.

It will be frequently remarked, that the diarrhœa which continues for a time after dysentery, is accompanied by an evidently salutary effect, in the increasing strength and flesh of the patient. When the diarrhœa is thus salutary, the evacuations, although frequent, are generally not materially diseased: they are usually of a good colour, feculent, and fluid, and voided without griping or tenesmus.

When the motions are morbid, or attended with abdominal soreness, sense of heat, griping, tormina, tenesmus; if they be slimy, or at times sanguineous, and the patient complains much of thirst and of fever, with restlessness at night,—the disease evidently possesses a character which must be removed by art, and which nature is generally incapable of counteracting, especially after an acute attack of disease. In cases of this description, the remains of inflammatory action should be dreaded as existing in complication with a morbid condition of the secretions; and judicious means should be resorted to, in order to remove both these states. Here local vascular depletions are necessary, especially if the patient have not been depleted early in the disease. If his strength has been lowered too far to admit of this measure, the employment of blisters to the abdomen, followed by a succession of hot poultices, and these by a thick flannel bandage, the warm bath, and stimulating frictions upon the abdomen and lower limbs, will often prove serviceable.

The propriety of changing the morbid secretions in this form of the disorder is obvious, particularly if accompanied by disease of the liver. With this view it will be well to exhibit full doses of calomel with opium at bed-time, giving a gentle cooling purgative in the morning, and either resorting to camphorated mercurial frictions on the hypochondrium, or exhibiting the blue-pill with ipecacuanha, or Dover's powder, internally. If these means fail of improving the secretions, the character of the stools, and the attendant symptoms, other means should be resorted to. But, while the above remedies are being employed, injections of emollient and

anodyne substances into the colon should be practised, with the view of soothing the morbidly increased action of this viscus, of protecting its excoriated and irritable surface from the action of the morbid secretions, and of diluting them, and thereby rendering them less irritating to the tender surfaces along which they are to pass.

After the employment of mercurials, the nitric acid with opium deserves a trial; and whilst it is being exhibited internally, the nitro-muriatic acid solution should be applied, in any of the modes already recommended, to the hypochondria or abdomen. The adoption of the above measures will not stand in the way of an alterative dose of some mild mercurial preparation given at bed-time, and a gentle purgative in the morning; whilst enemata, consisting either of the infusion of ipecacuanha, or of the decoctum lini with mucilage, should be thrown up twice or thrice daily.

In the latter stages of chronic dysentery, especially when much debility is complained of, the infusion of cinchona, or of cinchona and rhubarb with tinct. opii, will often prove of much benefit. If the debility be urgent, and especially if symptoms of ulceration of the large bowel be present, without tormina, or pain upon firm pressure of the abdomen, the infusions or decoctions of the cinchona or rhubarb will be advantageously prepared, for the purposes of injection, by adding to these substances, previous to their infusion, a small proportion of ginger, or of any of the warm spices. Infusion of catechu may be also used, under similar circumstances to the above, in the form of injection, with advantage and may be combined with the warm spices. In the chronic dysentery of the natives of India, and of those Europeans who have resided long in the country, the above tonic and stimulating injections should not be overlooked.

When chronic dysentery or diarrhœa is evidently the result of relaxation of the vessels of the internal surface of the bowels, and, like a gleety discharge, proceeds from a protracted habit of increased secretion, then the use of the above means, and of gentle tonics and astringents combined with anodynes and mucilaginous substances, exhibited both by the mouth and in the form of injection, is particularly necessary. The same directions for the administration of enemata which were given when treating of the acute disease, are applicable in chronic dysentery or in chronic diarrhœa.

If the evacuations be accompanied with, or preceded by, pain, tenesmus, and a recurrence of the bloody discharge and mucus, the retention of morbid secretions and fæcal matters ought to be dreaded.

When the patient has preserved some degree of appetite during the more acute period of the disorder,—or whether this may have been the case or not,—if purgatives have not been judiciously resorted to, or have been omitted for some time, which is often the case from fear of debility, fæcal accumulations will have formed in the cæcum and colon, which require to be removed. Here the exhibition of purgatives of a mild and cooling nature, both by the mouth and *per anum*, are indispensably requisite; after which, diaphoretics, injections of the infusion of ipecacuanha and of emollient substances, with a bland, farinaceous diet, will be beneficial.

Chronic disorder, either in the form of slight dysentery or diarrhœa, not unfrequently supervenes to the acute disease, in consequence of incautious exposure to the night-air, to atmospherical vicissitudes, to errors of diet and regimen, and to the want of comfortable beds and clothing. When this is remarked, the state of the patient should be carefully inquired into, and if any one symptom indicating the presence of inflammatory action of the colon be present, and the strength of the patient permit, local depletion, followed by the discipline so frequently recommended, should be put in practice; and purgatives, diaphoretics, diuretics, and emollients, afterwards exhibited. The food of the patient, at the same time, must be bland and mucilaginous; and if the powers of life appear to sink, gentle tonics, combined with absorbents, mucilages, and opiates, must be resorted to.

It should always be kept in recollection, that the necessary employment of tonics, astringents, or anodynes, in chronic dysentery, when the powers of life are much exhausted, often occasions a slight accumulation of fæcal matters in the large bowels, and requires the occasional exhibition of a purgative medicine. Under these circumstances, a dose of the oleum ricini, or the bitter aperient mixture, or rhubarb, or the compound jalap powder, will be most advantageous, and may be followed, in two or three hours, by an emollient injection.

When diarrhœa continues after dysentery for a longer time than is necessary to the resolution of the inflammatory state of the large bowels, and restoration to their healthy functions, the patient gaining neither strength nor flesh, it evidently requires to be restrained. This continuance of morbid action may be owing to improper diet and regimen during convalescence, or to an imperfect conversion of the chyme into chyle, a large proportion of the alimentary matters entering into combinations to which their chemical properties dispose them, under the states of moisture and increased

temperature in which they are placed. This effect upon the alimentary matters may proceed from the debilitated state of the digestive organs, or from this state associated with a morbid or deficient secretion of bile. If this be the case, as it undoubtedly often is, the use of gentle tonics, in order to restore the powers of digestion, alternated or combined with antacids, as magnesia or ammonia, or the cretaceous preparations, in order to neutralise acidity in the *prima via*, is obviously necessary; and with the view of improving the secretions, the milder mercurial preparations should be given, combined, with the carbonates of the alkalies, whilst the nitro-muriatic solution may be employed externally.

While this plan is being practised, the occasional exhibition of laxatives, to carry off morbid secretions, and prevent fæcal accumulations, will be necessary; and for this purpose, no medicine can be more beneficial than the infusions of gentian and senna, or in conjunction with any of the neutral salts, as circumstances may suggest. At the same time, emollients, mucilaginous, anodyne, or even tonic enemata may be thrown up, according to the state of the patient, and the particular symptoms by which the case may be characterised.

In those chronic cases which have been denominated "*white flux*," from the muco-purulent and gleety appearance of the discharge, the muciparous glands of the large bowels are generally in a state of disease, and require the use of gentle tonics, combined with astringents, and alternated with purgatives and mercurial preparations. In the majority of these cases, the bile is either entirely obstructed, or it is secreted in insufficient quantity and quality. In order to restore the biliary secretion, and at the same time give energy to the relaxed mucous surface of the colon, I have generally exhibited full doses of calomel at bed-time, with opium, and given the bitter aperient mixture in the morning, with advantage. Occasionally, I have also prescribed with benefit a pill composed of aloes, calomel, and ipecacuanha, and directed an infusion of cinchona, rhubarb, and ginger, to be employed in the form of enema; or infusions of catechu, simarouba, columba, cinnamon, &c. in the same manner.

Whenever astringent tonics are prescribed in the more chronic cases of dysentery and diarrhœa, their effects should be carefully watched. They ought never to be ventured upon when pain of the abdomen and other symptoms of inflammatory action of the colon are present; and when prescribed in cases accompanied with great prostration of strength, the sudden arrest of the discharges, and con-

sequent retention of morbid secretions, ought to be guarded against. This is best accomplished by the occasional exhibition of a purgative, or by the injection of an aperient enema.

When the affection of the bowels seems to be symptomatic of disease of the liver, or occasioned by inflammatory action, of a chronic kind, existing in the substance of that organ, and giving rise to a vitiated condition of the bile, our remedies should be chiefly directed to this seat. In cases of this kind, it will be often difficult to ascertain whether the liver be affected or not. But if the patient complains of weight, tightness, or oppression about the right hypochondrium and ensiform cartilage, with cough, pearly state of the eye, and morbid condition of the evacuations, and, in short, with any of the symptoms which I have insisted upon when treating of chronic affections of the liver, local depletions, mercurials, purgatives, nitric acid, and the nitro-muratic solution, must be successively resorted to, according to the particular circumstances of the case, and the treatment previously employed. In addition to the above means, external irritation may be tried, either by means of the common blister, kept discharging for some time, or by a seton inserted below the small ribs of the right side. The tartarised antimonial ointment may also be rubbed in, so as to bring out a copious crop of pustules; and in some cases it may be combined with a third part of mercurial ointment and a few grains of camphor.

In many instances of complicated chronic dysentery, as well as in its simple form, the *warm bath*, followed by very energetic frictions of the lower extremities, and more gentle frictions of the abdomen, either with a flesh-brush, a coarse towel, the recently introduced horse-hair gloves, or with some stimulating liniment, have proved of essential service. After they have been used, the abdomen and loins should be well bandaged. In both these forms of chronic dysentery the *nitro-muriatic solution* either as a bath, in poultice, or by ablution, is generally beneficial. It has been chiefly in the more obstinate cases that its efficacy has been proved, as other means of cure have usually been premised more calculated to evince their effects in a short time, and this and other remedies of a slower operation deferred. Whilst the nitro-muriatic solution is being employed externally, small and repeated doses of blue-pill with ipecacuanha and opium, or any mild mercurial with Dover's powder, may be exhibited; and if the bowels at any time should not be sufficiently free, so as to lead the practitioner to fear the accumulation of fæcal matters and morbid secretions in the cæcum and cells of the colon, a full dose of some purgative should be prescribed

and repeated from time to time. In such chronic cases as are complicated with a morbid secretion of bile, or some structural change of the liver, the above alterative mode of treatment is more especially required; and in addition to it, a full dose of calomel should be given occasionally at bed-time, and followed early in the morning by a dose of the bitter aperient mixture, or the compound jalap powder.

If the affection of the bowels be kept up, from relaxation of the mucous surface and vessels supplying it, and a deficient or entirely obstructed flow of bile, tonic injections should be thrown into the colon; and mercurial ointment with camphor may be rubbed upon the hypochondrium, or laid on the surface of warm poultices. After this mode of rousing the energies of the liver has been tried, a blister may be applied over the region of this viscus; and after it has been healed, the mercurial ointment may again be applied as before or a plaster composed of the empl. ammon. cum hydrarg., the empl. Galban. comp., or the empl. picis comp. may be placed upon the right hypochondrium and epigastric region.

When the bile is secreted either in deficient quantity or quality, acidity of the contents of the *prima via* should always be dreaded, and more especially if the stools be pale, frothy, yeasty, or seemingly fermented. In these circumstances, a combination of the sub-carbonates of the alkalies, or magnesia, with alterative doses of mercurials, and with the gentler tonics, may be tried; whilst the external means of cure above stated should be put in practice. The cretaceous mixture may also be given occasionally, and be made the vehicle for other remedies which the circumstances of the case may suggest, as small doses of rhubarb, of the vin. ipecac., or of columba.

In cases of this nature, one grain of calomel with half a grain of ipecacuanha, given every two hours, is often extremely serviceable. Or, instead of this, one or two grains of calomel with four of Dover's powder may be taken every three hours; and I have often prescribed two grains of calomel, with one of ipecacuanha and half a grain of opium, every third hour, with much benefit in more obstinate cases. Whilst the calomel acts, in this combination, upon the secretions generally, especially those of the liver, the ipecacuanha and opium restrain the increased discharge from the mucous surface of the bowels, and determine the circulation to the external surface of the body.

The observations offered, when treating of the more acute forms of dysentery, on the employment of emollients, camphor and opium,

bark in conjunction with rhubarb, infusions of ipecacuanha, and mucilages, with lime-water, &c., are applicable in many cases of chronic diarrhœa, especially those which are consequent upon the acute disease, and in which vascular depletions and purgatives have been judiciously directed. As respects also the treatment of those local symptoms which are most frequently met with in the acute dysentery, the same remedies may be resorted to when they supervene in the chronic disease, as where recommended when the removal of these symptoms was the subject of discussion.

In some of the more chronic cases, especially when tenesmus or *prolapsus ani* are present, the injection of small enemas, consisting of one part of vinegar to three or four of cold water, has often proved of service. Occasionally, has been added to this, with increased advantage, four or five grains of the superacetate of lead, with a few drops of laudanum. The nitro-muriatic lotion may be also used as an injection. Care should, however, be taken not to repeat these injections more frequently, nor to continue them longer than is necessary to a fair trial of their effects; and if the bowels should become too much or too quickly restrained by them, an aperient draught should be given, and repeated according to circumstances. Instead of the superacetate of lead, I have found much benefit from small injections of a weak solution of the sulphate of zinc; and have given this salt in doses of about half a grain, by the mouth, in conjunction with ipecacuanha and myrrh, with decided service in similar cases. These medicines, especially the sulphate of zinc, may be combined with mucilages and anodynes, and exhibited either in the form of injection or in that of a draught or mixture.

In the more chronic cases of diarrhœa accompanied with great prostration of strength, and occurring after active disease, the preparations of iron, especially the sulphate of iron, or the tinct. ferri muriatis, will generally be given with the greatest advantage. The sulphate of iron may be combined with either the sulphate of soda, or the sulphate of potash, or of magnesia, when we are desirous of carrying away the secretions and fæcal accumulations formed in the bowels, at the same time that we wish to produce a tonic and astringent effect upon the digestive mucous surface and follicular ducts of the intestinal canal.

Strictures of the colon are a frequent consequence of repeated attacks of dysentery and of the chronic forms of the disease and of diarrhœa. It is obviously difficult, however, to ascertain the existence of this lesion during the life of the patient; for in the majority

of instances in which they have been found, the rectum has been of its usual diameter, and they have generally been situated too high to be reached by a rectum bougie. Even under ordinary circumstances, it is perhaps impracticable to introduce the bougie into any part of the sigmoid flexure of the colon; but during a state of disease characterised by inflammatory action of the mucous surface of this bowel, frequently with ulceration, always with great irritability of its muscular tunics, and sometimes with softening of its structure, attempts to pass the bougie beyond the rectum would generally be impossible, and always dangerous, from the facility with which the bowel may be injured by such attempts.

Mechanical means of ascertaining the existence of stricture of the colon being entirely out of the question, we are obliged, therefore, to depend solely upon such inferences as may be drawn from the phenomena characterising the affection. If there be a great difficulty or utter impossibility of procuring full and feculent evacuations, the patient not labouring under tenesmus or the acute symptoms of dysentery; if the motions be scanty, fluid, and containing semi-dissolved or broken-down fæces; if they be preceded by an uneasy sensation in the course of the colon, with distension, fulness, and sense of load about the cæcum and right hypochondrium, or between the epigastric region and the umbilicus; if there be considerable tumidity of the abdomen, with flatulent eructations and a foul and feculent odour of the breath; if an injection of any considerable bulk cannot be thrown fully into the bowel, or if it returns immediately; and more especially if these symptoms supervene to previous attacks of dysentery and diarrhœa, or after a protracted attack of these diseases,—we may then dread the presence of stricture of the colon, particularly in the left descending colon, and above the sigmoid flexure, although we cannot be certain of its actual existence. The accumulation of hardened fæces, or even of a large gall-stone in this part of the intestinal canal, may occasion all the symptoms enumerated; but when such accumulations form in this situation, a careful examination of the abdomen will often detect them, particularly in lean subjects, and thus assist in ascertaining the real nature of the disorder.

In all cases of chronic disease characterised by irregularity of the bowels, the abdomen and evacuations of the patient should be carefully examined, and his sensations previous to, or during, the passage of a stool attentively inquired after. I have often heard the patient complain, in cases which seemed to me to have been decidedly stricture of the colon, of a sense of tearing, scraping, or of

gnawing, in some part of the course of the colon, previous to the acting of an aperient medicine upon the bowels; the abdomen, especially about the cæcum and the ascending and transverse colon, being hard and tumefied, and the stools fluid, dark-coloured, with broken-down or semi-dissolved fæces, and with shreds of white mucus or albuminous exudations. In cases of this nature, our object must be to preserve the contents of the large bowels in a fluid state, in order to prevent accumulations of fæcal matters from forming above the stricture, and the irritation which indurated substances would occasion. The mucous surface of the strictured part of the bowel is generally in a state of chronic inflammation or ulceration, cooling laxatives, mucilaginous, refrigerant, and anodyne remedies, and emollient injections should therefore be employed. Gentle friction, employed twice daily over the abdomen, is also extremely serviceable in cases of this nature, especially when it follows the exhibition of a cooling laxative or of an emollient enema.

In respect of the particular remedies which are to be preferred in cases of the presumed existence of stricture of the colon, I shall offer but a few remarks. Amongst those which excite the actions of the alimentary canal, the most gentle in their operation, and the most cooling as respects their general effects, should be selected. Manna, magnesia, tartrate of potash, the soda tartarizata, castor oil, supertartrate of potash with sulphur and confection of senna, tamarinds, and the mildest preparations of mercury, may be employed, combined with such other remedies as the circumstances of the case may suggest. I have always considered that aloetic purgatives have a better effect in softening and rendering the fæces more fluid than any other medicine, though I fear they may prove too irritating to the rectum in cases of this description. Saline purgatives, especially the sulphates, when given alone, occasion watery motions, without removing hardened fæces, and exhaust sooner the strength of the patient. In this disease, whilst we endeavour to procure fluid feculent evacuations, watery discharges should be avoided. More decided advantage will often be obtained from the above mild aperients than from the more active cathartics, which are frequently prescribed. The same remark applies also to the use of aperient enemata. I have often succeeded better with the common soap injection, or the decoctum lini with a little castor or olive oil, than with injections of a more purgative kind. The gentler means soothe the frequently attendant irritation of the large bowels, solicit their natural actions, and dissolve the tenacious or hardened matters above the seat of stricture; whilst active cathartics excite

the raw and inflamed surface of the constricted part, and increase the morbid state which it is our object to remove.

It will often prove extremely serviceable to combine an anodyne or antispasmodic medicine with the aperients given by the mouth or thrown into the colon, more especially when there is reason to infer that the stricture, supposing it actually to exist, is not of long duration. When describing the appearances which stricture of the colon usually exhibit upon examination after death, I stated my belief that this lesion was often owing to spasm in the first instance, produced by the inflamed and irritated mucous surface, and that the spasmodic contraction probably became permanent, owing to its continuance and the extension of the inflammatory action to the more external coats and structure of the strictured part. If this be actually the case, the propriety of combining anodyne and antispasmodic remedies with laxatives cannot be questioned in theory, and, as far as experience has instructed me, their efficacy as auxiliaries, cannot be doubted in practice. I have been in the habit of preferring ipecacuanha in the form of powder or infusion, given by the mouth, frequently in combination with the sub-carbonate of soda, or the soap pill, and the extract of hyoscyamus, or as an enema. I have also conceived that advantage has been obtained from the use of camphor, in conjunction with ipecacuanha and some one of the cooling aperients enumerated above: it may likewise be administered in emollient and mucilaginous injections. In some of the more obstinate cases the injecting tobacco-smoke *per anum*, has proved decidedly beneficial.*

In addition to the above means, the nitro-muriatic solution may be employed externally, and it may be alternated with the use of the linim. hydrarg., the linim. camph. comp., or the linim. sapon. cum opio, rubbed assiduously over the abdomen; or those three liniments may be combined and used for the same purpose, and in the same manner.

Amongst the natives of India, the treatment of chronic dysentery and chronic diarrhœa should always partake more or less of a tonic and stimulating character; for although the use of laxatives or purgatives, with attention to the biliary secretions, is requisite, the relaxed state of the mucous surface of the digestive canal, and

* Tobacco-smoke injected *per anum* is often extremely serviceable in obstinate constipation; and I think it might be of advantage in intus-susceptions, by inflating the gut, and removing spasm. When spasm of portions of the intestines, particularly of the large bowel, is occasioned by the irritation of hardened fæces, I think that tobacco-smoke would be useful. It at least deserves trial.

the low or adynamic condition of the frame generally, which dysenteric disorder rapidly induces amongst them, when not met by judicious treatment at its commencement, imperatively require the use of tonics, astringents, and stimulants, combined so as to impart tone and energy to the intestinal tube, and to restrain inordinate and exhausting discharges. Whilst, however, we find it necessary to resort to the exhibition of remedies possessed of these properties, care should be taken not to produce any degree of constipation: for if the morbid and acrid secretions be retained but for a short time in the cæcum or colon, ulceration of an atonic character will readily supervene; and in the native constitution, such a termination takes place rapidly, and without the previous appearance of any acute symptom which may warn the practitioner of the likelihood of its approach. At the same time, therefore, that tonics, astringents, and stimulants, are being exhibited, laxatives should either be combined with them, or given at intervals, according to the particular circumstances of individual cases.

In natives, as well as in Europeans, purgatives ought never to be laid aside whilst we have reason to suppose, from the symptoms present, the condition of the stools, and the state of the abdomen, that fæcal accumulations and morbid secretions still remain or are newly formed in the *prima via;* but the employment of cardiac and restorative remedies should not be relinquished, or even interrupted, by the use of purgatives: both classes of remedies are equally necessary, and quite compatible as respects their operation. With the natives, rhubarb combined with cinchona, ginger, and small doses of sulphate of iron, is particularly serviceable in either the chronic diarrhœa or chronic dysentery. The sulphate of iron may be also exhibited, with the requisite quantity of sulphate of soda or sulphate of magnesia, either in the infusion of quassia, or in some aromatic water. When thus prescribed, any of the hot spices should be combined with the iron as a corrigent.

Columba, catechu, the betel-nut, lime-water, pomegranate bark, serpentaria, kino, cascarilla, simarouba, sulphate of zinc, cayenne pepper, cinnamon, ginger, the black and white pepper, cloves, &c., have been also employed with great advantage, either combined with one another, or with aperients, tonics, mucilaginous substances, or with anodynes, and given either by the mouth or by injections, or in both ways, and may be administered twice or thrice daily, or according to the circumstances of the case.

During the treatment of chronic dysentery and chronic diarrhœa, the *diet* and *regimen* of the patient ought to receive the strictest

attention; and such attention should not be limited to the time he remains under medical treatment, but be extended to the period of convalescence, and even for some time afterwards. In many instances I have found the disease remarkably prolonged by much eating, and by partaking of improper articles of food. It is almost impossible to regulate the diet of the natives, but, as far as it can be done, it should be attended to. The quantity, as well as the quality, of the food should be an object of attention. Eating more than is requisite for the support of the energies of the system often prolongs the disease; whilst, on the other hand, too low a regimen is apt to lower too far the powers of life, and diminish the resistance offered by nature to the inroads of the malady. While active disease or inflammatory action is proceeding in the colon, nothing beyond the lightest farinaceous or mucilaginous food should be ventured upon; and the patient's beverage may consist either of the weak nitric acid drink, or of imperial or tamarind water. Wine ought not to be exhibited, unless the powers of life require to be rallied. I have seen the too early permission to take a single glass of wine bring back the acute symptoms, and have often witnessed the chronic forms of the disease converted into the acute by such imprudence. When, however, the energies of the system are lowered so far as to prevent the employment of the requisite means of procuring evacuations from the bowels without the assistance of a cordial; when the disease assumes an adynamic character, or a disposition to a solution of the diseased textures,—wine, in a state of dilution, or in the farinaceous food of the patient, may be given; but in many cases, unless in those who have been in the habit of indulging in the use of vinous or spirituous liquors, the exhibition of infusions of tonic medicines, such as cinchona, cascarilla, columba, quassia, gentian, rhubarb, &c. is much to be preferred; although a too early and imprudent use of tonics, particularly while the acute or inflammatory state continues, is often equally hurtful.

During convalescence, a cautious return to full diet should be observed. In all cases of recovery from diseases of the stomach and bowels, the danger of relapse is great. The proportion of solid animal food at first ought to be small, and to consist of the white-fleshed animals. Wine and tonics ought to be of the lightest kind, and the clothing of the patient particularly attended to. A flannel roller or bandage should be worn in the chronic disease around the abdomen and loins, and this ought not to be laid aside. The bandage I consider to be of the utmost importance, as it gives a mechanical support to the bowels, and also protects the wearer

from chills and cold in the most susceptible part of his body. Flannel should also be worn by convalescents; it is most essential to protect the body from sudden atmospherical changes, and should never be laid aside. If a flannel bandage be found too warm, a cotton one may be substituted; for the support is essentially requisite. The patient whilst he thus shuns all excesses, or even irregularities, in food, drink, and clothing, ought to be careful of avoiding all exposure to rain, cold, wet, or moisture, and to the night-air and fogs. He should also shun the operation of currents of cold air, particularly during a state of free perspiration.

Sect. VIII.—*On Scorbutic Dysentery.*

Dysentery sometimes occurs complicated with scurvy in warm climates, both in ships and in armies. The association of these diseases is seldom or ever met with in the European community in civil life, for reasons which will be obvious when we consider the causes of this form of disease. In cases of long navigation or transport of troops; in campaigns, sieges, or active military services within the tropics, when there is a scarcity of fresh and wholesome provisions, with the prevalence of the usual causes of dysentery,—this form of disease frequently makes its appearance in a very destructive manner.

Scorbutic dysentery generally commences with a common diarrhœa, soon succeeded by frequent evacuations of a serous fluid, commonly of a dark colour, with the appearance of sanies, and with mucus and grumous dark blood, more or less mixed with feculent matters. The motions are often preceded by tormina or griping and attended with tenesmus; but these symptoms are much less violent than in the simple acute dysentery. The fæcal matters are seldom retained, the stools being free and sometimes copious. The general febrile movement of the system is not at first very remarkable, the pulse being then but little excited, generally small and weak; but in the progress of the disease it becomes quick, yet still small and feeble, marking the adynamic condition of the system characteristic of this malady.

The mouth and gums, the latter especially, are spongy, dark, livid, tumid, and bleed on the slightest pressure: the tongue is often raw, red, and flabby: the countenance pale, heavy, dull, dark, and dejected, sometimes sunk, and occasionally slightly œdematous: the abdomen is generally drawn inwards, and sore upon pressure: the lower extremities œdematous, with livid patches extending to

the hams; sometimes with petechiæ, and frequently with ecchymoses and breaking out of old ulcers, with coldness of the skin, particularly of the extremities.

The functions of the stomach are generally greatly deranged: there is often present obstinate vomiting, sometimes of a bloody, grumous, and bilious fluid, with distressing flatulence, and pain about the insertions of the diaphragm, owing to its increased action in the frequent retchings which occur. There is great disrelish of salted meat, or of the food on which the patient had been subsisting, with a desire after vegetable acids, vegetables, fruits, warm spices, fresh meats, and milk. Through the progress of the disease, copious effusions of blood, with detached portions of the mucous surface of the colon or rectum, are seen in the dejections of the patient, attended sometimes with coldness, lividity of the surface, and leipothymia: sometimes paralysis of the *sphincter ani* takes place, and excoriations about the anus. Flatulence, acidity of the stomach, looseness and falling out of the teeth, further tend to distress the patient, and to increase the extreme despondency under which he labours. There are also great loss of flesh, and debility. The biliary secretion is often more or less disordered: at one time it is copious, but still morbid, increasing the dysenteric symptoms and the excoriated state of the bowels; at other times it is diminished in quantity, and even almost altogether obstructed. The urine is generally scanty, of a deep colour, and sometimes sanguineous.

A favourable *termination* may be hoped for when the symptoms become ameliorated by medical treatment and diet; when suitable food is in the reach of the patient; when the causes of the disease are removed; and if the symptoms be mild, and the strength of the patient not greatly reduced.

Those symptoms which indicate extreme danger are, a lienteric state of the stools; the evacuation of portions of the mucous surface of the bowels; copious hæmorrhages from the intestine; extreme fetor of the evacuations or of the patient; cold, fetid breath; wandering of the mind, or loss of any of the senses; extremely quick or weak pulse; dyspnœa; faintings; cold extremities and cold abdomen; paralysis of the sphincter ani; great debility; vomitings of grumous, offensive matters; foul ulcers of the extremities, or a sphacelated state of the ulcers or ecchymosed spots.

Sometimes the disease degenerates into a state of chronic diarrhœa or lientery; every thing taken by the patient being followed by repeated evacuations, and passing through the digestive canal but little changed.

The *causes* of the scorbutic dysentery are those which have been already adduced as productive of the simple forms of dysentery, combined with living upon salted provisions, especially salted pork, without a due proportion of vegetables and fresh farinaceous articles of diet; innutritious food, or food of an unwholesome quality; deficient diet; the internal use of bad and offensive water, or water kept long in a stagnant state and shut out from the air; debility, however induced, especially by previous disease; an intertropical climate; and excessive fatigue, want of the requisite proportion of sleep, and long-continued exposure to moisture and night-fogs. In addition to these, the influence of concentrated marshy exhalations; particularly in situations bordered by the sea; disappointment, anxiety of mind and depression of spirits; nostalgia; and a too fluid kind of diet, or the habitual use of food in a fluid and highly diluted state, should be taken into consideration as acting frequently in conjunction with one or more of the foregoing causes. Some of these only predispose the system to the operation of the others; and some, which are merely predisposing in one case, are exciting causes in another, when present in an active or concentrated form.

As respects this form of dysentery which occurs in those previously affected by disorder of the bowels, it seems that the weakened mucous surface of the intestinal canal, particularly of the large bowels, is amongst the first parts to suffer that species of organic lesion characterising the scorbutic disorder; and that the morbid secretions poured into the upper portions of the intestinal canal, and the fæcal matters lodged in the large bowels, increase this morbid state of the mucous surface,—its capillary vessels losing their tonicity, and allowing the escape of part of the blood circulating through them. Ecchymoses, similar to those observed on the surface of the lower extremities, and to those seen in the bowels upon dissection of fatal cases, take place in the early stages of the disease; and the mucous surface covering the ecchymosed patches of the bowels loses its vitality and becomes detached, permitting large effusions of a grumous and semi-dissolved blood to take place from the abraded part. In cases where the patient had recovered from previous attacks of dysentery, leaving the cicatrices of ulcers in either the cæcum, colon, or rectum, it is extremely probable that these cicatrices break out afresh, similar to what is observed in cases of cicatrised ulcers, or other injuries of the extremities.

The *appearances* observed upon the examination of fatal cases of scorbutic dysentery are chiefly an ecchymosed state of the internal surface of the large bowels, sometimes extending, in patches,

along the small intestines into the stomach; a livid, purple, or darker condition than natural of parts of the colon, both internally and externally; and foul ulcers and excoriations in the cæcum, colon, and rectum. The ecchymoses are occasioned by the effusion of blood into the cellular tissue connecting the mucous to the muscular tunic, owing to the diminished tonicity of the vessels of the part. The mucous surface covering the ecchymosed and blackened spots may be so readily rubbed off by the finger as to evince a sphacelated state of this tunic in these situations. The excoriated and ulcerated parts of the bowels are generally of a deeper hue than natural, and of a foul or dirty aspect. When the bowel is contracted, its coats are commonly thickened, and doughy to the feel; but the colon, as well as the small intestines, are often distended by flatus of a putrid and very offensive odour. The tunics of the large bowels, and indeed of the digestive canal generally, are torn with ease. The liver is sometimes large, soft, and spongy: at other times pale, soft, and deficient of blood, especially in cases in which the loss of blood from the bowels had been great during life. The spleen is almost always greatly softened, and as if rotten; sometimes it is nearly semi-fluid. Indeed, all the textures of the body seem to have their tonicity, or the vital adhesions between the particles of matter composing them, greatly diminished. The blood also found in the large vessels and heart is always of a loose texture, or semi-fluid, if the examination has taken place soon after death. The structure of the heart itself is generally softened, and the pericardium and cavities of the chest often contain a bloody serum. The lungs are frequently congested, and the surface of the bronchial ramifications of a darker colour than natural, in large patches. The urinary organs are not usually much disordered in structure, but sometimes the mucous surface of the bladder is ecchymosed.

Sect. IX.—*Treatment of Scorbutic Dysentery.*

The chief intentions of cure in this complication of dysentery are, to remove the scorbutic condition of the system, and that pathological state of the bowels efficient of the dysenteric symptoms. While these objects are being fulfilled, it will be also necessary to restore the healthy functions of the secreting organs lodged in the abdominal cavity, and to combat any urgent symptom which may arise. These ends having been attained, we should endeavour to impart energy to the digestive organs, and promote healthy secretions generally.

The good effects of lemon-juice, and more particularly of recent limes, with a full proportion of vegetable diet, and moderate quantity of fresh animal food, are so well known, in counteracting, as well as in removing, all the forms of scurvy, that little further need be said upon the subject. In the particular form of the kind of disease now under consideration, recent lime-juice, with small doses of opium, is particularly serviceable, both in removing the scorbutic taint and the morbid state of the mucous surface of the large bowels. It may also, especially where there are considerable discharges of blood in the stools, be advantageously used conjoined with mucilaginous substances, in the form of injection, and it may be made the principal beverage of the patient. When lime-juice cannot be obtained, the citric acid should be substituted, and given with mucilages, opiates, and gentle tonics.

In cases where the presence of tormina and tenesmus indicates the retention of fæces and morbid secretions in the bowels, or where the motions are deficient of fæcal matters, an active purgative should be exhibited. The most appropriate medicines of this kind are those which operate gently, without irritating the mucous surface of the intestines. Rhubarb is, perhaps the best purgative which we can select; and we may either exhibit it in powder, or in the form of infusion with lime-juice. Manna is a useful medicine in cases of this kind, as is also the supertartrate of potash. Senna very frequently gripes, especially when the lime-juice is taken about the same time; and calomel, particularly when given in full doses, readily affects the mouth and salivary apparatus, without being followed by any beneficial effect upon the disease, but on the contrary, often aggravating it, and increasing the debility of the patient. It should, therefore, be avoided. If rhubarb fail of producing a sufficient effect, castor oil, jalap, or the compound jalap powder, with a little powdered ginger, may be substituted. Whatever purgative we may employ will be advantageously combined with warm spices or aromatics, and five or six drops of the tincture of opium or hyoscyamus. When this form of disease occurs amongst the natives of India, purgatives should never be exhibited, unless combined with warm spices and aromatics in large doses; and these latter remedies ought to be employed in the form of injection as well as by the mouth.

The means which are requisite to give tone to the mucous surface of the digestive canal will also impart it to the system generally. Of these the infusions of cinchona, rhubarb, quassia, catechu, in combination with aromatics and spices, and occasionally with opiates,

are the most beneficial, especially when a due proportion of fresh vegetables and fresh meat are within the reach of the patient. We should not content ourselves, however, by directing them to be taken by the mouth only: they should be administered also in the form of injection, and repeated according to their effects.

The exhibition of the aromatic confection, cretaceous powder, or the cretaceous mixture with opium, warm aromatics, and tonics, is frequently serviceable, especially in relieving the vomitings, heart-burn, and flatulence, which often accompany the disease. The different preparations of ammonia, especially the sp. ammon. comp., are still more beneficial in combating the above symptoms; and although I have not found the effects of the cretaceous medicines upon the bowel disease at all counteracted by the exhibition of the recent lime-juice, in which I so strongly confide for the removal of the scorbutic disorder,—this latter remedy is more compatible with the preparations of ammonia, whilst the ammonia acts as a powerful excitant of the nervous energy of the frame, which is so much depressed in this disease, without increasing vascular action.

When the hæmorrhage and copious evacuations from the bowels are such as to lower the powers of life, still more energetic means than those already enumerated should be taken, to arrest it as soon as possible. The tinct. ferri muriatis, in the infusions of quassia or catechu, may be resorted to, combined with the tinct. opii and warm aromatics; and the same combination may be administered also in the form of enemata; but care should be taken not to induce costiveness, which is always hurtful.

When the external ulcerations become foul, or the ecchymosed spots have a dark or greenish aspect, or the muscles and tendons are hardened and apparently contracted, the nitro-muriatic lotion is of the greatest advantage. In such cases, this application ought never to be neglected; and it ought also to be employed as a gargle, to correct the spongy and bleeding state of the gums, for which it is completely efficacious. With respect to its use internally, in this complication of dysentery, I cannot speak from experience, as I have chiefly relied upon the recent lime-juice; but where this cannot be procured, I conceive that the internal employment of the nitro-muriatic acids would be equally beneficial, as respects the morbid condition of the digestive mucous surface, with its application to the external sores.

When the more urgent state of disease is removed by these or similar means, the practitioner should endeavour to restore the

return of the healthy functions of secretion to the abdominal organs. This is best accomplished by the exhibition of the blue-pill with the aloes and myrrh-pill at bed-time, and by any gentle aperient taken in the morning, if the bowels require it, and combined with some tonic medicine. This plan should be continued as long as may be necessary, care being taken to exhibit through the day such bitter astringent and tonic remedies as the symptoms of particular cases require.

In the treatment of this complication of dysentery, as much reliance should be placed upon dietetic means as upon medicinal substances. What the diet ought to be in such cases, every one, acquainted with medical science must well know; but I beg to insist upon the use of recent limes, warm or spiced pickles and preserves, vegetables, pomegranates, shaddocks, guavas, and oranges, with a due proportion of fresh animal food. Rest, the comforts of a good bed, and the use of a bandage about the loins and abdomen, are equally requisite in this form of the disease as in the others which have been treated of.

CHAPTER V.

ON CHOLERA AND ACUTE DIARRHŒA.

THE observations and illustrations already offered upon the subject of increased secretion and discharges of bile, render it superfluous to make any lengthened remarks upon the subject of cholera and acute or bilious diarrhœa at this place. When an augmented secretion of bile is produced, the bowels are excited to increased action, and the motions, although fluid, are generally not materially diseased, farther than that they contain a more than usually large proportion of this fluid, which, mixing with the more or less disordered secretions of the intestines themselves, tinges the evacuations of various shades of colour. Yet, although this state of the alvine discharges generally does not indicate serious disease as long as it constitutes the principal disorder, it should always receive due attention; for the circumstance of the evacuations being more fluid and more frequent than natural, and of an unhealthy colour, should alone lead to inquiry into the state of the biliary organs; and as the irritation of the bowels must be either the result of a morbid condition of the bile, or of the secretions lining their mucous surface, or of increased determination of the circulating fluid to this situation, and consequently an augmented secretion from it, we should be prepared to combat one or other, or even all, of those pathological states. If the first of this series of morbid actions exists, the rest rapidly supervene, and continue at least as long as it is present, —the morbid state of the biliary secretion inducing both increased determination to the mucous surface, and augmented secretion. This state of irritation can scarcely be said to be, especially at its commencement, one of inflammation; but it may, either from the habit and constitution of the patient, or the circumstances in which he is placed at the time, or from injudicious treatment, be soon converted into inflammatory action of the most unequivocal kind.

When the secretions of the liver and of the intestines themselves are long retained, they undergo certain changes, rendering them more acrid and exciting to the parts on which they are lodged. In consequence of these changes, the accumulated and morbid biliary

and other secretions are discharged from the loaded viscera into the small intestines, where they induce disorder, great in proportion to their acrid qualities and their quantity, and in relation to the state of the intestinal canal at the time, and the susceptibility of the patient. If the biliary secretion be acrid and in large quantity, and the external causes have occasioned, in addition to the sudden and augmented discharge of bile into the duodenum, much congestion of the liver and adjoining viscera, sporadic or bilious cholera is the result; for the irritation produced upon the sensible surface of the duodenum by the morbid condition of the bile, affects sympathetically all the parts with which the nerves supplying this part of the intestinal canal have any connexion. Hence the vomitings, purgings, spasms of the abdominal muscles and of the lower extremities, the retraction of the testes, and the collapsed state of the external parts of the body.

Thus it may be perceived, that I regard the slighter and more acute cases of diarrhœa, up to the most violent cases of bilious cholera, as merely grades of the same pathological states; as diseases proceeding from morbid conditions of the biliary and intestinal secretions, and possessing severity according to the extent of those morbid conditions; as diseases chiefly of function at the commencement, but soon inducing, particularly in their more severe forms, inflammatory action and rapid exhaustion of the powers of life, if neglected or improperly treated.

In those cases which amount not beyond simple diarrhœa, it often happens that increased secretion from the mucous surface of the intestinal canal, with determination of blood to this situation, may continue for a considerable time after the disordered secretions which first excited it have discharged themselves, and after the morbid functions of the liver have been removed. Sometimes this condition of the bowels will gradually subside, with but little assistance from art beyond abstinence and avoiding exposure to the causes of bowel disease, the increased secretion from the mucous surface bringing about a resolution of whatever inflammatory action may have been present. This issue should not, however, be confided in; for, owing either to the habit and constitution of the patient, to the diet, regimen, and treatment adopted, inflammatory action of a slow or insidious nature may supervene, prolonging and rendering more obstinate the symptoms of the disorder, until it terminates at last in inflammation of the bowels, in chronic diarrhœa and ulceration, or in dysentery.

If to the symptoms of diarrhœa supervene a sense of heat, dull

gnawing pain, severe griping, and any of the phenomena described when treating of inflammation of the bowels, the existence of inflammation of their mucous surface, especially of the small intestines, should be suspected, and its termination in ulceration, in the extension of the inflammation to all the coats of the bowel, or in acute dysentery, ought to be dreaded.

In the *treatment* of the forms of diarrhœa and bilious cholera, it would be unsafe to restrain the evacuations by means of astringents and anodynes; for, by so doing, the increased secretion of bile might be converted into inflammation of the liver, or the simple accumulation of this fluid in the ducts and gall-bladder, would be followed by serious disorder, even if it failed of inducing inflammatory action of the biliary apparatus. Nor would the bad effects of astringents in such cases be confined to these organs; the bowels would also be liable to suffer; and the sudden arrest of the increased secretion from their mucous surface, and the consequent retention of the morbid secretions collected in them, might be followed by acute inflammation, or by a dysenteric attack. The objects in the treatment of these disorders should be *first*, to carry off the morbid secretions and accumulations; *secondly*, to prevent the supervention of inflammatory action in the liver or intestinal canal; and *thirdly*, to restore the healthy functions of the digestive tube and assistant chylopoietic viscera.

The means which are best adapted to the fulfilment of the first intention generally also accomplish the second. Of these, the use of warm diluents and demulcents, combined or alternated with gentle cooling aperients and diaphoretics, claim particular notice. The warm bath, followed by friction of the surface of the body, and emollient enemata, are also extremely serviceable. When the bowel disease is accompanied with vomiting and spasm, amounting to cholera, it is desirable to allay the irritability of the stomach in the first instance, in order to carry into effect the other parts of the treatment. With this view, twenty grains of calomel may be exhibited with two of opium, and followed by gentle purgative or laxative and emollient injections. By these means the vomitings and spasms are generally allayed; after which, demulcents, with the supertartrate or tartrate of potash, the soda tartarizata, or the common effervescing draughts, may be taken, and repeated according to circumstances.

If the discharges become more natural and diminish in frequency, from the use of these means, but little more is required excepting attention to the diet and regimen of the patient; but if the dis-

charges from the bowels continue disordered, the calomel should be repeated at bed-time, and followed in the morning with the compound jalap powder, or any other purgative that may be preferred. If the irritability of the stomach and spasms have not been allayed by the first dose of calomel and opium, it may be repeated, and a purgative and emollient enema administered; afterwards, cooling laxatives and demulcents should be prescribed, and a warm bath of a high temperature, followed by frictions, resorted to.

It seldom happens, even in the most severe cases of acute diarrhœa and bilious cholera, that more active measures than the above are requisite, if the patient is seen soon after the commencement of attack; and whether the disease proceeds from the sudden irruption of long-retained and acrid secretions, or from the ingestion of irritating and hurtful substances into the stomach, they are commonly equally beneficial. As long, however, as the evacuations are morbid, calomel or the blue-pill must be exhibited at bed-time, and gentle aperients, combined with demulcents and diluents, be taken on the following morning by the mouth, and administered by injectio .

If the frequency of the evacuations exhausts the strength of the patient before they improve in their appearances, they may be somewhat restrained by the occasional exhibition of an anodyne combined with an alterative; the compound ipecacuanha powder with blue-pill, in small and repeated doses, is perhaps the best which can be employed. Diluents and demulcents should be taken as frequently as the stomach may bear them, and a mild, farinaceous diet directed; whilst laxatives and demulcents should be thrown into the colon twice or thrice daily. For the purpose of injection in those cases, the decoctum lini with the inf. ipecac., the common starch enema, gruel with the soda tartarizata or with olive oil, are amongst the best which can be adopted.

The washing out the colon and rectum by means of warm water only, or of the simplest emollient *lavements* which can be used, is extremely serviceable, inasmuch as the retention of morbid secretions and fæcal matters in the cells of the colon is thereby prevented, the mucous surface of this viscus protected, and the disordered secretions diluted and rendered less hurtful to the parts with which they come in contact. Whilst injections of emollient substances act in this way upon the lower part of the intestinal canal, demulcents and diluents taken by the mouth produce a similar effect upon the upper portions of the tube; render the secretions more copious and less irritating; and, with the assistance of the enemata,

diminish the tendency to inflammatory action in the alimentary canal, by soothing its irritated surface, and by determining the circulation to the surface of the body.

If pain, a sense of heat, burning, soreness, or tenderness from firm pressure, supervene in the course of these disorders in the abdomen or hypochondria, or if retchings continue, or even take place for the first time, notwithstanding the above means have been duly employed,—cupping, or a number of leeches should be applied to the abdomen, and, after they have ceased to bleed, be followed by hot poultices or fomentations. If, in addition to pain, soreness, or sense of heat, the pulse becomes excited and the skin hot, with thirst and a desire for cold fluids, the local depletion ought to be such as, with the assistance of the means which are to follow, shall remove the most urgent symptoms of disorder. The operation of the leeches will of itself tend to subdue the inordinate action of the bowels, or at least facilitate the effects of the other means which are employed. After the local depletion, a full dose of calomel and opium is generally serviceable, followed by diaphoretics and diuretics exhibited in small and repeated doses.

If, during the employment of these remedies the stools become unfrequent and scanty, yet still morbid, with griping or tenesmus, or if costiveness be threatened, gentle and cooling purgatives, and laxative, emollient enemata are required. As long as the evacuations are morbid, the retention of them, even for a short time, in the *prima via*, is often productive of increased disorder, and should be avoided.

When the disorder assumes the form of common diarrhœa, and after the morbid accumulations which first excited it are removed, the discharges often continue, from relaxation of the mucous surface and exhausted tone of the vessels and ducts terminating in it. Cases of this description sometimes become more or less chronic and mild in their course; and, owing to the debility of the digestive functions, the morbid state of the secretions, and the consequently imperfect chylifaction, acidity and crudities take place in the *prima via*, which tend to perpetuate the bowel complaint. In cases such as these, the use of magnesia, cretaceous preparations, or ammonia, in combination with gentle tonics and aperients, is obviously requisite; and, as the secretions of the liver are generally in fault, calomel or blue pill, with the aloetic pill or with rhubarb, may be taken at bed-time. The carbonates of the alkalies are also beneficial in these cases, particularly when combined with a gentle tonic, and exhibited three or four times daily. If the evacuations still con-

tinue too frequent, the alkaline and cretaceous medicines may be given with the infusion of cinchona or of catechu, or they may be combined with any astringent or aromatic, or with small doses of opium.

Having abated the prominent symptoms of disorder, and procured the discharge of those morbid secretions and accumulations which were its chief cause, our next endeavour must be to restore the healthy functions and tone of the digestive organs. This will be most readily accomplished by means of gentle tonics, conjoined or alternated with aperients or purgatives, as particular cases may require. During convalescence, as during the attack, the diet of the patient should be strictly regulated. In the more violent seizures, abstinence should be enforced; for nourishment, in whatever shape it may be administered, cannot be converted into chyle; it consequently must undergo changes to which its chemical affinities, under the circumstances in which it is placed, dispose it, and become an additional source of irritation to the sensible and excoriated bowels. In the slighter attacks, or such as amount merely to a common diarrhœa, the farinaceous and mucilaginous articles of food are the most appropriate. Soups and milk, if longed for by the patient, may be tried, and if they be found to agree with him, may be allowed, particularly the latter; but they are often productive of acidity, and should therefore at first be given with some distrust. As convalescence proceeds, the lighter kinds of animal food may be allowed, and the patient should be instructed to guard against relapses, to which he will for some time be liable, from any error of diet, or from exposure to the external causes of bowel complaints, which are so prevalent in warm climates. In order to protect himself from these, he should wear a flannel waistcoat or a flannel bandage around his loins and abdomen, and avoid exposure to the night-dews and fogs; and in all things conform to those precautions already laid down.

On the Severer Forms of Cholera.—Cholera of a severe form and in several particulars resembling that variety of the disease which has been epidemic in the East, although somewhat different in several of its symptoms, occasionally occurs in all warm climates, particularly in India. This form, called by the French "*mort de chien*," has been well described by Dr. James Johnson, in his work on Tropical Climates. That the epidemic cholera is, however, identical with the severe form of cholera called *mort de chien*, I cannot affirm,—and I certainly have seen as many instances of both diseases as any practitioner,—but they resemble one another in

many particulars. The epidemic disease may, perhaps, be so far the same with the other, as to constitute a variety resulting from the unusual prevalence of this severe form of cholera, favoured by an epidemic constitution of the atmosphere, which tends to dispose the system to the inroads, whilst it heightens the intensity, of the causes. In the *mort de chien*, or severe spontaneous cholera, the discharges from the stomach and bowels are nearly the same with those observed to characterise the epidemic disease; the spasms of the muscles, particularly those of the lower extremities, are as severe, although not so general, nor so often affecting the respiratory organs and the muscles of the chest and upper extremities, as in the latter malady. But in the former I have not observed the very dark and ropy appearance of the blood; the cold, wet, and shrivelled state of the surface; the almost total absence of pulse at the wrist; the very marked and rapidly increasing collapse of the powers of life; the disagreeable and earthy odour of the body even during the life of the patient; the burning sensation between the scrobiculus cordis and umbilicus; the complete arrest of the biliary and urinary secretions; the cold tongue and mouth; and the coldness of respired air, which characterise the epidemic disease.

In the one, the powers of life are certainly very much deranged, and the circulation and functions of the internal organs greatly disturbed; but in the other, all their derangements and their attendant symptoms are, as will presently be shown, of a much more alarming and malignant nature; the balance of the circulation is much more completely overturned, the circulating fluid itself most sensibly and seriously diseased; the respiratory functions more disturbed; the spasms of the voluntary muscles more general, and more clonic as respects their nature; the purging and vomiting of shorter duration, and forming a less prominent feature of disease; the surface of the body more deprived of its vitality and of the usual quantity of blood circulating through it; and the powers of life are more completely overwhelmed, and sooner sink altogether, than in the disease formerly observed to occur occasionally in warm climates, under circumstances favourable to its appearance.

In the epidemic malady, the powers of life are insufficient of themselves, even although assisted by the administration of stimulants, to overcome the congestion of the internal organs, and restore the circulation in the surface of the body and in the extremities; and while the large secreting viscera in the abdomen remain engorged by the thick and viscid blood thrown in upon them from the external surface, and their vital powers overwhelmed,

their functions of secretion must necessarily be arrested; and thus they are unable to remove the load oppressing them, by one of the modes in which congestion of secreting organs is usually overcome.

In the severer forms of cholera occurring sporadically, the derangements, being less malignant than in the epidemic malady, are more readily removed by an energetic and appropriate treatment. Here the exhibition of large doses of opium, calomel, and stimulants, is generally sufficient to restore the balance of the circulation, remove spasm, and to excite the secreting function of the liver.

CHAPTER VI.

ON THE EPIDEMIC CHOLERA OF INDIA.

HAVING, in a previous work*, to which I have already had occasion to make frequent reference, treated of the history of this disease, I shall, in this place, confine myself to a statement of the symptoms and progress of the malady, its pathology, causes, and the treatment, which in the course of my practice I have found to be attended with the greatest success. The frightful ravages of cholera when appearing in an epidemic form renders the subject one of the deepest interest, and demands particular notice in a work professing to treat of the diseases of warm climates.

SECT. I.—*On the Symptoms and Progress of Epidemic Cholera.*

That the symptoms and progress of the disease may be fully brought before the reader, and that the view of the practitioner may be directed to those changes which indicate the commencing invasion of this disease, I shall call attention—*first*, to the description of its usual progress; *secondly*, to its early symptoms; *thirdly*, to the symptoms of the advanced stage of the disease; and, *fourthly*, to its Pathognomonic and Prognostic symptoms.

1. The progress of the disease is generally as follows: the patient feels, for several hours, or for a greater or shorter period, according to circumstances, a sense of general uneasiness and anxiety about the epigastrium, with a feeling of heat in this situation. These symptoms increase more or less rapidly; and the countenance, which at first is merely expressive of uneasiness, soon becomes more and more anxious and distressed. The pulse, at this time, is generally quickened, and always oppressed. This state of the system forms the first stage of the disease—a stage which, from its importance in the treatment of the disease, I have called the stage of invasion.

* Sketches of the most prevalent Diseases of India, Lond. 1825, 8vo. Second edition, 1829, 8vo.

Accompanying these symptoms sometimes, but always supervening immediately to them, the patient complains of sickness at the stomach, and an uneasy sensation which seems to invade the whole track of the digestive tube. To this sense of general disorder, and of derangement more particularly of the alimentary canal, soon succeed a copious evacuation of the stomach and intestines, a sense of exhaustion, of sinking and emptiness, and an irregular spasmodic contraction of the muscles of the lower and upper extremities. The evacuations which take place at this time consist, in a great part, of the matters remaining in the stomach and alimentary canal at the period when the patient was seized with the disease; and, from the abundance of these evacuations, and the sense of emptiness and exhaustion produced by them, it seems as if the contents of the whole tube were completely discharged at this time.

The spasms, which generally come on at this period, soon increase; but, although they are tolerably general, especially in the extremities where they commence, they seldom attack the muscles of the back, loins, and face: the abdominal muscles are affected next in succession to the extremities, and lastly the thoracic muscles and diaphragm. With respect to the nature of the spasms, it appears to me that they partake more of the clonic, than of the tonic character; but the kind of spasm varies much, even in the same patient, in different stages of the disease; in some cases it presents more of the tonic character at the commencement, but gradually assumes the clonic form, which, upon the whole, seems to be the predominating kind.

With the supervention of spasm, and the evacuation of the alimentary canal, deafness, giddiness, noise in the ears, coldness of the extremities and surface of the body, are also present. Great oppression at the præcordia and epigastrium is now generally felt, attended by difficulty of breathing, and general collapse of the system. The pains sometimes felt in the abdomen are of a colicky nature, and often violent; but these, as well as the pain accompanying the spasms of the muscles of the abdomen, and of the extremities, are relieved by pressure and friction. The skin becomes colder and colder as the disease advances, and is covered with a damp, which increases to a copious, cold, raw moisture, which bedews the shrunk, sodden, and cold integuments, especially of the extremities. The countenance now assumes a contracted or collapsed, cadaverous, and anxious appearance. The eyes are sunk in their sockets, and are surrounded by a livid circle. The pulse becomes first

small, quick, oppressed; and afterwards, it scarcely can be felt at the wrist. Blood taken at this period is quite black, thick, and oily, and it frequently will not flow from the vein. The arterial blood also presents the characters of that usually circulating in the veins. The patient all the while complains of a burning sensation about the epigastrium and umbilicus, and of an unquenchable thirst. The tongue and mouth are, however, moist, cold, and white. The vomitings and stools are now frequent, and consist entirely of a fluid resembling rice-water, with mucous flocculi and albuminous matter floating in it. Sometimes these matters are muddy, turbid, and somewhat different in colour; but they are always without any admixture of bile. As the disease advances, these evacuations become less frequent, and sometimes subside for a considerable time before the death of the patient. The same may be said with respect to the spasms. The urine seems not to be secreted, and not only it, but even the saliva, and all the glandular secretions, appear to be completely arrested during the continuance of this dreadful malady.

As the disorder advances, the eyes and other features become more sunk, and the corneæ assume a flaccid appearance. The extremities are perfectly cold, covered with a cold, clammy moisture, and their surfaces sodden and corrugated. The voice becomes feeble, sepulchral, and unnatural; the respiration more and more oppressed, generally quick, and sometimes slow; and the air which the patient expires is cold. During this state, restlessness is generally observable, and is sometimes very urgent; the patient tosses about continually, and evinces the utmost distress. Although he is listless, impatient of disturbance, averse from speaking, and is altogether physically overwhelmed, still he retains his mental faculties to the last hour of his existence.

Towards the termination of the disease, the sense of anxiety at the præcordia and epigastrium increases. The restlessness appears to degenerate into a kind of jactitation; the vital actions gradually sink, and, at last, entirely disappear; and the patient dies, generally, within twelve, fifteen, twenty, or twenty-six hours from the invasion of the disease.

2. It is a matter of the most serious importance, that the symptoms denoting the invasion of the epidemic cholera be familiar to the practitioner. From these symptoms, I am fully convinced, that an attentive observer may discover the approaching invasion of the disease; and, by having recourse to suitable treatment, may prevent it from assuming that degree of severity which it inevitably

would assume, if it were left uninterfered with even for a very few hours; and which would lead to a fatal termination, in a great many instances, notwithstanding the employment of the best-adapted and most active means.

An experienced practitioner will discover, in the countenance of the patient, the earliest changes which mark the approaching invasion of cholera. It is expressive of something approaching a state of anxiety, although the patient himself may not be aware of his state, or even that he is at all ailing. If the medical attendant inquire how he feels at this time, he generally answers, "Very well:" but if pressed upon the subject, he acknowledges that he experiences feelings which he cannot distinctly describe, though he has neither pain nor sickness. His spirits are, however, low, and there is a clammy moisture sometimes on the skin, and the pulse, though occasionally full and strong, is evidently oppressed and labouring. It is not, however, that kind of pulse which will attract particular attention, unless we are upon the alert for this disease; but being prepared for such a visitation, it is impossible to mistake it: and bleeding at this moment will be attended with the happiest consequences. As this stage of the disease advances, the patient feels considerable nausea, and has his bowels more freely moved than usual; but the stools then generally consist of such matters as have been lodged in the large intestines, and consequently they present various appearances, according to the state of the digestive organs at the time of invasion. The patient, however, complains of no actual pain, even on pressure made upon the abdomen, either in this, or in the subsequent stage, but what is the result of the spasm in the latter. He feels chiefly a great degree of exhaustion, and inability to make the least exertion. Colicky pains are felt in the belly; but they often pass off, or are relieved by pressure and the free evacuations which take place in this stage. The urine, in the period of invasion, is often in small quantity, and seldom voided.

The abdomen is more than usually tumid, evidently from congestion of the viscera lodged in this cavity; this is sometimes remarked even in those cases where a sense of emptiness is complained of, after the repeated retchings and purgings. When the disease is fully formed, it seems as if the blood is almost altogether accumulated in the large venous trunks and viscera of the great cavities, occasioning the phenomena which constitute the second stage of the disease.

3. The symptoms usually looked for, as marking the advanced

stage of this disease, are vomiting and purging of a thin watery fluid, similar to rice-water, with white flocculent matter floating in it. Severe cramps supervene in the legs, arms, and muscles of the abdomen, and in many cases become even more general. The eyes are sunk, and the features sharp and collapsed. The skin is generally cold, and covered with a cold, clammy dew. There is scarcely any pulse at the wrist, and, if it be at all perceptible, it is small and thready, and generally quick; but it sometimes conveys the idea of oppression. The extremities are cold, livid, and shrunk. Sometimes there is considerable heat about the chest and epigastrium, and the head is in general hot. The respiration is oppressed, interrupted, laborious, and frequent or irregular. The tongue is not particularly foul, though, at times, it is covered with a thin coat of glairy mucus; or it is dry and white, having the appearance of being without blood; but it is not furred. The lips are cold and blue. The fluid stools are generally discharged from the bowels with a considerable degree of force, as if they were ejected from a syringe; but they are usually unaccompanied by pain.

During this stage the patient voids no urine; and, judging from the phenomena of the disease, and the appearances observed on the dissection of fatal cases, I believe that the functions of the kidneys are entirely suspended; the watery part of the circulating fluid usually secreted by the kidneys being completely drained off, by the diseased action of the mucous surface of the digestive canal.

The appearance of the extremities is peculiar, particularly of the superior extremities: the hands and fingers are shrivelled, as if they had been soaking in warm water for a considerable time. The nails are blue, and sometimes there is a blue cast over the whole skin. The prostration of strength becomes now excessive, and the thirst insatiable, evidently owing to the defect of the aqueous part of the blood, from the number of watery stools. Accompanying this insatiable thirst, the patient generally complains of an inward heat, and of a burning sensation about the umbilicus.

These are the symptoms which are generally observed when patients are first brought for assistance, both in natives and Europeans; they differ only in degree, and are merely modified according to the activity of the existing cause, and as the strength and vigour of the patient may have given rise to some degree of reaction of the vital energies of the system.

In this stage the spasms become more general; but the muscles of the back and of the face are uniformly exempt from them. Notwithstanding the urgency of the vomiting and purging, the patient

feels little or no pain on pressure being made upon the abdomen: indeed he generally makes but little mention of any other painful sensation than that of a colicky nature, and what accompanies the spasms and the burning sensation in the abdomen to which I have already referred. In some cases, however, excruciating pain of the abdomen, stomach, and limbs, is complained of, and is aggravated by the recurring spasms and evacuations.

In respect of the appearance of the stools, and of the matters thrown off the stomach in this stage of the disease, I may remark that, when the bowels have not been fully emptied during the previous stage, the stools which are the first evacuated generally vary in appearance, according as the matters lodged in the intestines may modify their character; but they generally assume the appearance of congee-water, with flocculent matter floating in them, or matter of a still more albuminous character. But in no case of the disease do we find, in this stage, any appearance of bile in the stools; nor does bile ever appear in them until the violence of the malady has received a check, and until it is allowed to flow into the duodenum, from this circumstance, and from the operation of the remedies employed.

As to the appearance of the matters thrown from the stomach, it may be generally stated, that they consist, at first, of such ingesta as may have remained in this viscus at the time of attack, and that they are afterwards in every respect similar to the matters which come away from the bowels. When the disease draws to a termination, the violence of the retching and purging often ceases; but still a watery, and sometimes an ichorous fluid continues to flow both from the mouth and anus until the death of the patient.

4. The symptom which I have always looked for as particularly marking this disease—and I have never seen a case of the epidemic wherein it did not exist—is a burning sensation between the scrobiculus cordis and umbilicus, precisely over that spot where a vermilion blush was invariably found on examination after death. This is one of the first symptoms the patient is sensible of, and it is generally felt before vomiting or purging takes place. Whenever this painful sensation is accompanied with an anxious look, and a general feeling of weakness or oppression, even without vomiting or purging, we may be certain that the disease is at hand; and at this stage it is generally manageable, if boldly and decidedly treated.

The vermilion blush over the small intestines—which blush exactly resembles the colour they assume when injected to show the the villi—I conceive to be peculiar to this disease, and belonging to

its pathological character, because it is the only appearance that is not observable in many other diseases: for instance, congestion of the brain is found in an equal degree in apoplexy; and in various visceral affections, we find occasionally congestion to a great extent in the liver, spleen, lungs, &c. &c., but the peculiar vermilion appearance observed in cholera, I do not recollect to have seen, by any means, so generally in my examination of those who have died of other diseases of the abdominal viscera. I am, however, fully aware that this appearance may sometimes be found in cases of sudden death; but I am anxious to draw attention to this particular symptom, and to connect it with this particular appearance of the small intestines, which appearance will always be found on examination after death. This symptom, therefore, I consider as particularly characteristic of the epidemic cholera; and this morbid appearance, which is related to it, I conceive to be the particular lesion which is uniformly to be met with on dissection of cases of the disease.

It is seldom, indeed, that patients are seen before all the symptoms are fully developed, and then the pulse at the wrist generally cannot be felt. There is little to be expected from human art at this period of the disease; yet I have seen such cases recover frequently, but still I consider recovery to be quite a chance, and to be, perhaps, owing more to the constitutional strength of the patient than to the remedies employed, or to the knowledge and judgment of the practitioner. I am, however, quite satisfied that the disease will prove perfectly manageable if the treatment be commenced in its early stage, and before the state of congestion be firmly established.

Diagnostic Symptoms.—There is no symptom of the disease more uniform than the black, thick, and ropy condition of the blood taken from a patient in the epidemic cholera, particularly when the disease is fully formed. This condition of the blood, of which the arterial blood also partakes, is, even of itself, and still more particularly when viewed in connection with the other symptoms, sufficient to distinguish the disease from the cases of sporadic cholera formerly occurring in India, and from the cholera usually observed in warm climates, or in temperate ones during the autumnal seasons. The low and exhausted state of all the vital actions, the depression of the patient's spirits, the unnatural appearance, and cold, dewy condition of the surface of the body; the withered and cold state of the extremities, the extension of the spasms, so early in the disease, to the muscles of the superior extremities and chest; the entire absence of bile from the stools and the matters vomited, the sup-

pression or interruption to the secretion of urine, and to all the other natural secretions; the early depression of the action of the heart and of the pulse; the coldness of mouth, tongue, and respired air,—are phenomena which we find not similarly congregated in any other disease, and which are sufficient to distinguish it from the other species of spasmodic diseases in general, and from the bilious cholera, and even from the *mort de chien*, or more violent form of the cholera often observed in India.

The clonic nature of the spasms, the manner in which they attack the extremities and abdominal muscles, and their uniform absence from the muscles of the back, loins, and face, are circumstances sufficiently serving to distinguish epidemic cholera from tetanus and trismus. The copious evacuation of the bowels and stomach, the state of the pulse and surface of the body, and the sensation felt, so early in the disease, at the epigastrium, serve to show that it cannot be confounded with colick. As bile is seldom if ever met with in the severer cases of the common cholera of India, until the violence of the disease is diminished, or medicines procure the flow of it into the intestines; and as the general phenomena of the disorder are so nearly allied,—it may be proper to allude, at this place, to the points of dissimilarity existing between it and the epidemic form of disease. But here I may also admit, that a number of the phenomena characterising both, differ chiefly in the greater malignity of those appertaining to the latter malady, and in the rapidity of their progress to a fatal termination. The absence of bile, however, from the matters voided in both forms of disease cannot be assumed as grounds of identity between them, more than the existence of spasm in both can be considered as such. In the latter form of malady, besides the more malignant nature of many of the phenomena common to both, we find that the dark and otherwise morbid state of the blood, the burning sensation complained of at the epigastrium, the low, weak, small, and undeveloped state of the pulse from the commencement of the attack; the cold tongue and mouth, the coldness of the respired air, and the great derangement of the respiratory function, the shrivelled state of the extremities, the cerebral congestion, the clonic nature of the spasm, the suppression of the urine and other secretions, the wide diffusion of the disease throughout southern Asia, its violence and fatal effect,—are circumstances which authorise the inference, that the epidemic cholera is different from the common cholera of India, as observed previous to 1817, not in degree alone, but that it is also different in kind. These circumstances cannot be explained by a reference

to a mere difference of intensity in the causes immediately producing both forms of disease, but must be referred to the existence of some superadded cause, whose presence and extension has been as general as the epidemic disease which it has been mainly efficient in producing.

Prognostic Symptoms.—The symptoms by which the practitioner may be led to hope that the disease will terminate favourably, are, an increase of the strength and fulness of the pulse, a return of warmth to the extremities, and an increase of heat on the surface of the trunk; less frequent calls for drink, and a diminution of the burning sensation in the epigastric and umbilical regions; diminished urgency, or cessation of the spasms, vomiting, and purging; the appearance of bile in the motions, and an inclination to void the urine, and still more particularly, if any quantity be voided; an improvement of the countenance, and a return towards the healthy appearance and functions of the skin; a more natural respiration, and an increased warmth of the air which is expired by the patient; an inclination to tranquil sleep, or a more lively aspect of the eyes; a ruddier or livelier appearance of the lips, tongue, and mouth; and less general uneasiness and restlessness. If, on the contrary, the symptoms mentioned in the description of the disease increase rapidly, notwithstanding the means of relief which have been adopted, and the functions of respiration become either very unusually slow and oppressed, or very quick and laborious, as if the patient were gasping for breath; and if the action of the heart be so greatly diminished as not to occasion pulsation in the extremities; when the features are sunk and collapsed, and the tongue and mouth become cold, and the breath occasions a cold and raw impression on the observer; and when the cornea begins to sink, and jactitation to be constant, the spasms, vomitings, and purging, at the same time to cease, we cannot hope for the recovery of the patient. The vital energy has then sunk so low, owing to the impression of the cause of disease, and to the more immediate effects produced thereby upon the nervous system, and upon the blood through the medium of the lungs, that it seems beyond the influence of medicine to restore it.

Sect. II.—*On the Pathology of Epidemic Cholera.*

Before I proceed to inquire into the essential or efficient cause of the disease, I shall first take a view of the alterations presented by the different textures and fluids of the body, and of the relation

which seems to exist between these alterations and the phenomena characterising the disorder; and after having brought before the reader a statement of the lesions in which epidemic cholera usually terminates, he will be possessed of grounds whence he may proceed to draw his own inferences, respecting the nature of the pathological condition constituting the earlier stages of the disease, and thence to infer the nature of the causes from which it seems to originate.

External Surface.—The appearances observable in subjects at the period of dissection, were a corrugated and shrunk state of the extremities; considerable lividity of the surface; and dark purplish colour of the lips and parts not covered by the cutis vera. The soft solids were apparently shrunk; the eyes sunken, the features astonishingly collapsed and ghastly for the short duration of the disease, and the vessels at the surface contracted and bloodless.

Head.—The sinuses and veins of the brain, and of its membranes, were always congested with black, thick, and viscid blood. The tunica arachnoidea was frequently opaque, and somewhat thickened and adherent to the adjoining membranes. Some gelatinous or serous effusion was often observed in the ventricles, and between the membranes. The brain was sometimes soft and pulpy, but it seldom presented any very decided marks of increased action. The congestion of black blood and the serous effusion so often observed within the cranium seem to account for the stupor, deafness, vertigo, and noise in the ears, generally present during the life of the patient; and it was usually found that the lesions just alluded to were more marked in the cases wherein those symptoms were most manifested.

Thorax.—The *heart*, and large *venous trunks*, were frequently distended by a thick black blood, which in some cases was fluid, in others semi-fluid; and when coagulated, having the appearance of a black friable jelly. The substance of the heart sometimes appeared softer, and more easily lacerable than in the healthy state. The *lungs* were generally shrunk, collapsed, filled with black blood, heavier than natural, and of a fleshy, hepatised, or bruised appearance. The *pleura* was usually pale and healthy; the *pericardium* natural, and sometimes contained a very small portion of serum. The relation which these lesions bear to the derangement of the respiratory and circulating functions observed in the course of the disease, seems sufficiently evident. These lesions, also, were remarked to be great, in proportion to the extent to which these functions respectively were deranged. Whilst, however, I am ready to grant that a great part of these derangements was merely consequent

on death, yet I must contend, that much of them had taken place before that issue occurred; and that the depression of the vital energy of the organs, at the time of the invasion of the disease, gradually led to, and became accompanied by, many of the derangements which these organs presented after death.

Abdomen.—Upon opening the abdomen, a peculiar offensive odour was sometimes observed, particularly in those who died suddenly. The *stomach* generally contained more or less of a watery, muddy, and sometimes a grumous fluid. The colour of this fluid was various; sometimes it was colourless, at other times greenish, or passing to a yellow tint; and in some cases it was brown, approaching to black. The peritoneal surface of the organ seldom presented any other appearance than a greater congestion of the veins than was natural. The mucous surface was sometimes covered by a dark-coloured slimy mucus, and when this was removed, considerable congestion of the venous capillaries was observed. This congestion seemed to be chiefly seated in the sub-mucous cellular membrane, and was occasionally so extensive in particular points, as to give the appearance of ecchymoses of this coat. The internal tunic was occasionally much corrugated, seemingly much thickened, and doughy to the touch, more especially when it was not much distended by fluid or flatus. The stomach was frequently flabby and relaxed, and its coats could be more easily penetrated by a harder body than usual. In those cases, in which some degree of re-action of the vital energies had taken place, the internal surface of this organ, particularly about the pylorus, presented a livelier colour, approaching to red, and was apparently thickened and contracted. The *omentum* was sometimes corrugated, or thrown to one side of the abdomen.

The *small intestines* were, occasionally, more than usually constricted in parts, frequently distended by flatus, and their veins generally engorged with black blood: externally they presented a doughy, thickened appearance, and their colour varied from a pale vermilion, through all the deeper shades, to a dark purple hue; the former being chiefly remarkable on the peritoneal surface of the duodenum and jejunum, the latter on the ileum, at its termination in the cæcum. These shades of colour appeared to arise from the different degrees of congestion in the capillaries and veins in different parts of the canal, from the injection of the arterial capillaries, and from the colour of the blood which the vessels contained. When the small intestines were laid open, their coats seemed thickened, especially if the intestine was not distended, or if it was in

any degree contracted; they were frequently flabby, and more easily torn than usual. The internal surface was generally found covered by a viscid, thick, and clay-coloured substance, which sometimes passed to a cream, or yellowish tint. This was particularly remarked in those who died after a sudden and short attack of the disease. When this matter was removed, the mucous coat itself was usually pale in the upper portion of the small intestines, and dark-coloured and congested in the lower part, particularly the ileum, which was often of a blue colour externally. When the disease was of longer continuance, and more particularly when some reaction of the powers of the system had taken place, this viscid appearance was detached to a greater or less extent, and was floating in the fluid contents of the small and large intestines; and the mucous coat then seemed more vascular, and the arterial capillaries appeared more injected, than in the former class of cases.

The *large intestines* were frequently contracted, sometimes they were distended, and at others, they were both contracted and distended at different parts, in the same case. Congestion of the veins and venous capillaries was generally evident, especially of those seated in the cellular substance connecting the tunics. The external coat was usually dark-coloured, owing to the blackness of the blood in the congested vessels. The mucous surface was frequently very vascular; sometimes it presented a dark red colour, especially if the patient had lived for some time, and strong stimulants had been administered. These intestines never contained any fæces, and the fluids met with in them were similar to those found in the stomach and small intestines.

Mention has already been made of the vascular appearance of the small intestines, and the symptoms referred to the umbilicus during the life of the patient; and the connexion between both seems evident. The irregular contractions and dilatations of the intestinal tube and the abundance of flatus in it, evidently appear, from the early existence of the colicky pains, to follow close upon the invasion of the efficient cause of the disease; and these pains may, consequently, be considered as an index of the first stage of these structural derangements, which, although originating in a defect of vital energy, may be farther increased by the morbid condition of the blood circulating in the vessels of these parts.

The *liver* was generally darker than natural, and loaded with black, thick blood. Sometimes this organ assumed a purplish, or dark blue colour; at other times it was mottled, enlarged, flabby or pulpy, and easily torn. The *gall-bladder* was always distended

by thick viscid bile, which was generally of a dark-green or black colour, in subjects who died before the appearance of bile in the excretions, and although the hepatic duct was large and permeable, the mouth of the common duct was generally constricted, and seldom permitted the bile to flow into the duodenum without considerable pressure made upon the gall-bladder. In those cases which terminated fatally after an illness of long duration, and in which some reaction of the vital energies, and a flow of bile into the intestines, had taken place, the gall-bladder was generally empty, or contained but a small quantity of healthy bile; and the common duct, although not always free from some degree of constriction, was generally more permeable than in the former class of cases. In a few instances the gall-bladder was quite empty, relaxed, and flabby. In almost all the cases wherein bile was observed in the excretions, and the gall-bladder was found empty on dissection, and consequently, when it could be legitimately inferred that this secretion had passed into the intestines during the life of the patient, I remarked, that the viscid matter usually found lining the mucous surface of the small intestines, in the former description of cases, was detached to a greater or less extent, and was either floating in the fluid contents of the large intestines, or entirely removed, along with the matters which had been ejected from them.

The *spleen* was generally enlarged, and engorged with black blood; and its texture was frequently soft. In some cases it fell to pieces whilst the examination of it and the adjoining parts was being performed, owing as much to an inordinate degree of distension, as to relaxation or softening of its texture. The colour of this viscus was uniformly darker than usual.

The *kidneys* were generally of a healthy structure, and presented no organic derangement which could explain the complete interruption which their functions had experienced in the course of the disease.

The *urinary bladder* was generally empty, and shrunk under the pubis: its mucous surface was frequently covered with a considerable quantity of a viscid, mucous secretion. The contracted state of the bladder was evidently the result of the absence of secreted urine.

The Blood.—The peculiar appearance of the blood particularly excited my attention in the first case of the disease which came under my care. In every dissection which I performed, I uniformly found the venæ cavæ, the mesenteric veins, the veins in the vicinity

of the heart, the vena portæ, the iliac and subclavian veins, and the sinuses of the brain, loaded by a thick, viscid, and black blood. The right cavities of the heart were generally distended with the same description of blood, and when any was found in the left cavities of this organ, it was similar in appearance to that lodged in the right. The lungs were always completely engorged with blood, of a pitchy or black appearance, and all the internal viscera presented a greater or less degree of congestion of blood, possessing nearly the same characters. The blood-vessels, at the external surface of the body, and in the extremities, were generally contracted and empty, or nearly so.

That this condition of the circulating fluid was not consequent on death, although it might be more or less heightened thereby, is evident from the appearances which this fluid exhibited when taken away from a patient, even at an early period of the disease. During the subsequent stage, and more especially as the disease advanced to a fatal issue, the particular characters of the blood which have been now noticed were most manifest. That this state of the blood was the first material derangement consequent on the invasion of the efficient cause of the malady, I shall not contend: but that it was one of the earliest links in the chain of effects consequent to that cause, and that it afterwards tended, by a necessary and evident process, to heighten and to perpetuate the derangement whence itself sprung, I have not the least doubt. That the nervous influence, in some manner or other, received the first impression of the morbid cause, and afterwards gave rise to this condition of the circulating fluid, may be inferred, if it be permitted to conceive that a diminished function of the lungs, liver, and other excerning viscera, was co-existent, or nearly so, with that primary change; and consequently, that the blood did not undergo an elimination of its effete and noxious constituents, to an extent requisite to the performance of the organic actions and the continuance of life.

The appearances on dissection, both as respects the solids and fluids, were precisely the same in the natives of the country, as in Europeans. The only difference—and which does not affect the general interference—was, that in the former the disease generally terminated rapidly, the powers of life being readily overpowered; and that congestion after death was generally remarkable in these: in the latter, reaction more frequently occurred, and, consequently, appearances of capillary action were more observable in them than in the former.

SECT. III.—*On the Causes of Epidemic Cholera.*

Efficient or Proximate Causes.—The morbid appearances so uniformly exhibited in this disease, show that venous congestion was manifested, to a greater or less extent, in every stage, and in every instance, more particularly in the fatal cases; and this congestion differs only in degree, according to the strength and vigour of the patient, and the activity or intensity of the cause.

I have already stated that the venæ cavæ, the right auricle and ventricle of the heart, and the pulmonary arteries, were loaded with blood. The pulmonary veins also returned black blood to the left auricle and ventricle of the heart, and, when blood was found in the arteries, it was black and viscid. The liver and spleen were in a high state of congestion; and the vessels of the brain, both veins and arteries, were extremely turgid with the same kind of blood. This singular and sudden change in the circulating fluid appears to be the effect of some uncommon influence over the vital powers; but it is a question, what that influence is, and how that change is produced, which thus deranges the functions and general balance of the circulating organs, and which seems to deprive the system of the power of producing those changes on the blood, which are requisite to the purposes and continuance of life?

In death from suffocation, we know that the heart continues to pulsate for some time after breathing has ceased, that the blood passing through the pulmonary vessels no longer receives the influence of oxygen, and consequently that black blood is circulated: we know, moreover, that arterial blood alone can support the energies of the brain, and, therefore, that the influence of black blood upon this organ, must be deleterious to the whole circle of the vital actions. Bichat has proved, that, when black blood has been injected into the vessels of the brain, the functions of this organ become immediately disturbed, and very soon cease. Sir Benjamin Brodie has observed, that "dark-coloured blood, which has been transmitted through the circulating system, during the suspension of respiration would seem to act like a narcotic poison upon the brain. No sooner does it enter that organ, than deleterious effects are immediately produced, the animal falls into a state of stupor, the pupils of the eye become dilated, the respiration is laborious, the muscles of the body convulsed, and the animal dies poisoned by its own blood." This fact seems to explain many of the symptoms of epidemic cholera; but I must observe, that, although the circulation generally

was remarkably weak from the first, and the pulse at the wrist could seldom be felt, yet respiration never ceased altogether, although it was performed with great labour and difficulty; and sometimes, especially at the close of life, was much slower than usual. The senses, too, were generally retained to the last moment of life, although stupor, deafness, and deficient sensibility, were often very considerable. It would appear, however, that, notwithstanding respiration was continued, the blood was either not oxygenated, or imperfectly so; and the patient sunk like one who dies from the poisonous influence of tobacco.

We are assured, by the best authorities, that extreme vicissitudes and irregularity of seasons, great excess of cold, heat, moisture, or drought, are productive of disease: and that such variety of seasons cannot exist without producing corresponding alterations in the composition of the atmosphere itself; but what these changes are, have not been explained. The existence of electricity in the general mass of air which surrounds us is acknowledged by every one; and to infer that this fluid, which is so wonderful in its effects, cannot exist in the atmosphere without a certain influence upon animal life, cannot be viewed as an unreasonable conclusion. The experiments and researches of modern philosophers agree in proving, that electricity enters into the composition of all material substances, and some suppose, with Mr. John Hunter, that "a subtile substance of a quiet and powerful mobile nature seems to pervade every thing, and appears to be the life of the world; and, therefore, it is probable a similar substance pervades organised bodies, and is the life of those bodies." Mr. Hunter has explained how a morbid state of the fluids may induce an unhealthy action of the vessels, and how the latter may reciprocally occasion the former, supposing that the vital principle of the vessels, acting on that of their fluid contents, produces chemical changes by a concert of affection between both, which he has called "harmony." These notions at the time were considered obscure, but the experiments of Sir H. Davy, and of other modern inquirers, demonstrate the probability and rationality of his theory, and prove that there are electrical actions, by means of which all combinations and decompositions of matter are occasioned, and that what is called electricity pervades every substance, whether solid or fluid. We see considerable vicissitudes in temperature from certain affections of the stomach, while respiration and circulation remain unaltered; a circumstance which can only be explained upon the principle of local nervous excitement, or torpor, or some similar affection of the vital powers of the parts which

undergo such transitions. This opinion is supported by Sir B. Brodie's experiments, which prove, that respiration and circulation may be artificially kept up, after all connexion between the brain and heart and lungs was cut off; but, although the circulation was continued in these experiments for some hours, yet the body cooled as rapidly and regularly as that of another animal, in which respiration and circulation ceased upon the division of the medulla spinalis. These experiments show, that the change produced by respiration upon the blood, is not of itself sufficient to maintain the ordinary temperature of animals, and that we must call in the aid of some other principle in order to account for the phenomenon.

The agency of the electric fluid, and its existence in animated nature, have been fully proved by experiments upon the *gymnotus electricus;* and various other facts show, that galvanic and magnetic electricity is essentially connected with the human frame, and continually exerting their influence upon it; but a variety of causes may concur to vary the equilibrium of this fluid; and if we admit that a certain portion of it belongs to all substances, we shall find no difficulty in believing that any alteration in the quantity, quality, or intensity of its action, will produce corresponding changes in the habit or health of the body; and that the sensibility of the nerves, as well as many other disorders which we cannot satisfactorily account for, may be owing to the body being more or less in a positive or negative state of electricity.

From these considerations I am led to conclude, that either the absence of electricity from the human body, or some important change in its electrical state, arising, perhaps, from exposure to a negative electrical atmosphere, may be the cause of the dreadful and destructive epidemic which has recently ravaged the East; and that the vicissitudes of the seasons preceding this formidable visitation may support this opinion. If this view of the subject be correct, we may readily account for the sudden attacks of the disease, the changes in the temperature and sensibility of the body, and in the fluids, which changes seem chiefly to characterise it, and for the manner in which it has been limited to some districts, extended to others, and has successively ravaged all.

How far this peculiar state of atmosphere and seasons in India may have influenced the change in the circulating fluid, to which I have ascribed the sudden death in cholera, is a question I am not prepared to answer; but, I may observe, that for some time previous to the visitation of the cholera, my attention had been particularly attracted to the peculiarly thick and black appearance of the

blood, in almost every case where I had occasion to perform the operation of venesection, whether in common cholera, dysentery, fever, hepatitis, or rheumatism; and this was particularly remarkable in that drawn by leeches, which was generally more like *tar* than blood. This appearance I, at first, imputed to the change which this fluid is supposed to undergo in the stomach of the leech; and, therefore, passed it unnoticed, till my attention was arrested by its continual presence,—whether the blood had been taken by means of venesection or of leeches, and by its nearly uniform occurrence amongst all classes of persons of whatever description,—from the most delicate female to the robust and hardy soldier.

In the advanced stage of epidemic cholera, the blood was so thick that it would not flow at all, but came away in heavy drops. At the very commencement only of the disease could blood be drawn; and even then it had the appearance of thick black oil. If, however, it flowed freely till the fluid became thin and of a bright red colour, the operation was generally beneficial, and the case became manageable. In cases of disease of the liver, fever, and dysentery occurring during the period referred to, the blood flowed freely from the vein, though in a languid stream; but it was always thick and black. When leeches were applied, and particularly when applied to the præcordia or head, they remained fastened to the skin for upwards of two hours, without drawing more than half an ounce of blood; and this, in general, was so excessively thick, that it could not be taken from them but with difficulty, and, in some instances they died before they were removed. That this very unnatural and uncommon condition of the blood, which appears to me to be produced by an unusual accumulation of carbonaceous matter, must lay the foundation for formidable congestive disease, cannot, I think, be disputed.

I regard epidemic cholera, therefore, as essentially an affection of the nervous system, and consider the diminution of the nervous power to be the proximate effect of the efficient cause of the disease, that cause being the electrical condition of the air, arising from, or accompanied by, terrestrial exhalations of a kind unfavourable to animal life. That the depression or affection of the nervous influence soon affects the blood appears evident, and that the black, unoxygenised state of this fluid heightens the previous derangement, and leads to the extinction of life itself, seems equally probable. That the circulation of black blood produces this effect, whether arising from its unoxygenised state; or in an excess of carbon; or, in both these states combined,—still its effect upon the action of

the heart and upon the brain will be the same; and death, or extreme debility, &c., will be the uniform result of the presence of venous blood in the left cavities of the heart, and in the arteries. Therefore the phenomena of the advanced stage of cholera may be considered to proceed chiefly from the presence of black blood in the heart and arterial system, blood of this colour being found in these parts.

In epidemic cholera the circulation at the wrist soon ceases, but the pulsation in the carotid artery can be felt to be strong till a few minutes before death, and for some time after it ceases at the wrist; showing that the blood is carried to the brain till the last moment of life. We may, therefore, infer, that death in this disease is occasioned in the same way as in drowning, *i. e.* owing to black venous blood being sent to the brain, and destroying its influence.

Predisposing and Exciting Causes.—It has been customary to assign a variety of efficient as well as of predisposing and occasional causes to this disease: nor can it be denied that a state of derangement, very nearly resembling epidemic cholera, is produced by many deleterious substances—for instance, tobacco; but I am disposed to consider an unknown morbific condition of the atmosphere, or, as Sydenham would have called it, a choleric constitution of the air, whether that constitution result from its electrical state, or from the nature of the terrestrial exhalations existing in it, to be the effective cause, without which the epidemic form of the disease could not have existed; and whatever favours the action of this cause, I consider to belong to the predisposing and occasional causes only.

This morbific condition of the atmosphere appears to be powerfully debilitating or sedative. Whatever, either directly or indirectly weakens the body, will diminish its power of resisting this sedative agent; and will consequently prove a predisposing cause of the disease. As this condition of the air, however, eludes our senses, it is no wonder that the more obvious predisposing and occasional causes, such as hunger, fatigue, intoxication, cold, &c., should have often been regarded as the true causes of the malady. But as in former times, (*i. e.* before 1818) and under circumstances perfectly similar, neither cold, hunger, fatigue, nor intoxication, produced the disease, they cannot be considered in any other light than as concomitant or exciting causes, or as favouring the action of that cause upon the system, without which the epidemic disorder could not exist. They merely aid the action of such a noxious power, by diminishing the resistance which the system can oppose

to its influence. Much of the modification which the disorder assumes, as respects both its violence and prevalence, may be easily explained by inferring a variation in the intensity of the actual cause of the epidemic, and in the degree of predisposition of the patient, or of his vital resistance to its effects.

On this supposition we may easily explain all the occurrences which, at first sight, seem to favour the doctrine of contagion. Troops were attacked whilst marching; because the fatigue, privation, and variations of temperature to which they were exposed, produced the necessary predisposition, and often proved the exciting cause of disorder; while the inhabitants of the country who were not so predisposed, were enabled to resist a cause of no great intensity. When, however, the immediate cause was more intense, the inhabitants, though they resisted it longer than the predisposed troops, still ultimately suffered. This accounts for the occurrence of the disease in many villages of the ceded districts, and in those between the river Kistnah and Hyderábad, after the troops among whom it prevailed had marched by or through those countries. Several reasons might be assigned for the cases which sometimes occurred among the troops at stations, soon after the arrival of corps or detachments in which cholera had prevailed. It is, I believe, a well-known fact, that European soldiers, on arriving at a new cantonment or garrison, almost invariably get drunk. The debility consequent upon such a practice may be considered as a predisposing cause; and if natives do not indulge to the same extent in spirituous liquors as Europeans do, they have recourse to excesses equally debilitating. The attack of one detachment and the escape of another, while marching by the same route, and nearly at the same time, may probably be explained by considering the length of the journey which each had previously performed, the internal economy of the corps to which those attacked respectively belonged, and the degree of salubrity of, and the price and quality of provisions at, the stations through which they had marched.

But it may be said, that predisposing are sometimes convertible into exciting or occasional causes of the disease; nor will I object to the general proposition; nevertheless, I am still of opinion, that there must be some morbific condition of the atmosphere, whatever that may be, without which the disease cannot exist, and which has no necessary relation with the other classes of causes, farther than what may be occasional and fortuitous, although often concomitant. Whatever state of atmosphere produces the malady, or whatever predisposes the system to its invasion, I am decidedly of opinion,

that sudden exposure to cold is its most common exciting cause, owing to the check which it gives to capillary circulation on the external surface of the body.

With respect to the influence of particular kinds of seasons, of the states of the weather, and atmospherical vicissitudes, as predisposing and exciting, or as efficient causes of epidemic diseases in general, and of epidemic cholera in particular, much difference of opinion exists. But, although I consider that such states of the seasons in India may act either as predisposing or exciting causes, according to circumstances, yet I cannot conclude that such seasons should be considered as the efficient cause of epidemic cholera, seeing that this effect has not, on other occasions, been observed to follow the imputed cause; and seeing that such a cause is inadequate to produce the effect, in the manner in which it has recently been observed in India; and moreover, because, granting that the condition of the air, which I have inferred to be the cause of cholera, actually existed, the state of the weather may be considered as having been partly modified by that condition—unless, indeed, that condition resulted from the peculiarity of the season.

There can be no doubt that very unusually disturbed seasons prevailed at Madras and its dependencies, for several years previous to the appearance of cholera; but the want of precise information as to this matter, beyond my own personal observation, which can only apply to the particular part of the country in which I was stationed, prevents me from entering into any detailed consideration of this subject. I shall merely observe, in general terms, and in a few words, that the years 1815-16 were extremely hot. Strong southerly and westerly winds prevailed, and very little rain fell. The highest range of the thermometer in the shade, at Madras, was 104°, and the lowest 66°. The year 1817 was extremely close, with variable winds, chiefly from the south and west, and a very great fall of rain, with thunder and lightning. The highest range of the thermometer was 99°, lowest 66°. The year 1818 was similar to the preceding one. There were excessive, heavy falls of rain, continuing from July till January; a great deal of thunder and lightning, and a severe hurricane in October. The greatest range of the thermometer was 103°, the lowest 68°. The year 1819 was variable, the weather extremely hot, and westerly and southerly winds prevailed, with less rain than during the preceding years. A smart shock of an earthquake was felt at Wallajaahbad, about forty miles from Madras, in October: and, in the early part of the year, shocks of earthquakes were felt at Calcutta, Bombay, and at various

other places in Hindostan. The greatest range of the thermometer was 100°, the lowest 68°. In 1820 the weather was extremely irregular; frequent and heavy gales were remarked, and thunder and lightning extended over the greatest part of the peninsula. More rain fell during this year than during the preceding. The highest range of the thermometer was 98°, lowest 69°. In 1821-22-23 the weather was close, hot, sultry, and oppressive. There was very little rain, but strong southerly winds prevailed, which scorched, like fire, the trees and grass over which it blew.

It appears from Dr. Jameson's work on cholera in Bengal, that, for some years before the epidemic cholera made its appearance, they had excessive heavy rains, great droughts, storms, and earthquakes: he says, "that the changes which have taken place in the course and succession of the seasons within the last few years, in every part of Bengal and its dependencies, have been so striking, as to have not only attracted the notice of attentive observers, but to have become a frequent topic of conversation." Bombay, doubtless has partaken, in common with all other parts of India, in the general vicissitude and irregularity of seasons; and I imagine, there can be little doubt that this irregularity of seasons has been someway connected with that condition of the air to which I have imputed the epidemic; and if the latter has not produced the former, the concomitance of the two conditions are worth attending to, and their co-existence as causes, either of one kind or another,—the one determining or exciting the influence of the other. There can, however, be no doubt that some more unusual and more extended cause than the state of the seasons, or of the atmospherical vicissitudes just referred to, must have existed then, that did not previously; for we have witnessed, at former epochs, similar seasons and atmospherical vicissitudes to those now alluded to, without observing corresponding results arising therefrom; and we have seen the same excesses, the same privations, the same labour and exposure, in every degree, practised with perfect impunity till the year 1817. It is a singular fact, that while this epidemic raged in India during the years 1817, 1818, and 1819, there was also great sickness over almost the whole of Europe—a circumstance which favours the opinion I have endeavoured to establish, namely, that its efficient cause is one evincing more general relations, as well as a more intense mode of action, than can be assigned to mere vicissitudes of season.

Sect. IV.—*On the Treatment of Epidemic Cholera.*

Having thus stated the history and symptoms of epidemic cholera, and having inquired into its pathology and its causes, it now remains to treat of that to which the foregoing are preparatory, and subordinate. It is only by means of a clear and distinct view of the nature of diseases, that we can ever hope to be successful in the treatment of them. This object is to be acquired by close, attentive, and unbiassed observation at the bed-side of the patient, where not only the various changes which take place in the course of disease should be carefully noted, but where, also, the peculiar effects of each remedy should be narrowly watched.

For the treatment of epidemic cholera, I have always endeavoured to keep in view, the cause of those urgent and distressing symptoms which never failed to excite alarm, and to mark the disease. These symptoms generally assume the appearance of those of extreme debility, whilst oppression of the vital powers is the real cause; if, therefore, the disease be treated as one depending upon debility alone, without attempting to remove oppression, the practice will be at least uncertain, and, in general, unsuccessful.

Examinations of the bodies of patients who have died of epidemic cholera prove incontestably, that the system has been oppressed by venous congestion, and that the general disturbance of the constitution has arisen from this cause. The various changes which take place in the circulating fluids early in the disease, may, probably, arise from its effective cause of abstracting vital power, acting thus as a specific poison, and destroying the balance of circulation. Hence the blood is imperfectly propelled to the surface of the body, accumulates, in an unusual quantity, in the right cavities of the heart, in the large venous trunks, and in the lungs; and owing also to its high state of carbonisation, or defective state of oxygenisation, overpowers the remaining energy of the heart and lungs, and deprives them of the power of performing their functions with regularity. The lungs, being thus oppressed and overloaded, have not the power of oxygenising [or decarbonising] the blood, and hence, black blood is returned to the left auricle and ventricle of the heart, which, being deprived of their natural stimulus, cease to act with their usual energy, and consequently, the circulation in general becomes languid. If this view of the subject be correct, the indications of cure will be self-evident: namely, to remove oppression from the venous system, and to restore the balance of the circulation.

Bleeding, therefore, when it can be effected, should never be lost sight of. The object being to diminish the quantity of this fluid, in order to relieve the heart and lungs from oppression, and to enable them to perform their functions. This object, however, can only be attained in the early stage of this disease, and before the circulation ceases at the wrist; the necessity, therefore, of early assistance is manifest, because after this period blood will seldom flow from the veins, and when it does, the quantity is generally too small to afford relief. I have sometimes seen sixteen, eighteen, and even twenty ounces flow languidly, and in a very thick stream from the veins, then the bleeding stop suddenly, and the patient sink at once. In these cases, I have considered that the quantity of blood thus taken was merely that which had remained in the veins, after their circulation had been arrested, and that the bleeding ceased, when the veins were emptied. This circumstance has led to various opinions upon the propriety of bleeding, and has induced some to infer that death was accelerated by it. This may have been the case in some instances; but I conceive that the disease was then so far advanced, that death would have been the consequence under any circumstance, though probably hastened by the operation. I have, however, seen instances, wherein blood, drawn even in the advanced stage of this disease, has continued to flow till the balance of circulation was restored, and the patient recovered. In these cases the blood was at first thick, black, and came away in drops; at length it became thinner, and flowed with more ease, till the colour changed to a bright red. This is the change which should always be looked for, and whether it take place after the abstraction of one ounce or thirty, is of no consequence; this change must supervene before the patient can be considered safe. Under all circumstances, therefore, I think we should never forego a trial of the lancet.

Although I recommend bleeding to be attempted at all times, and in every stage of the disease, I am fully aware that many cases have recovered where it has not been used at all: nor do I answer for its universal success; but I do venture to assert, that, if it can be accomplished in the early stage of the disease, and before the circulation has ceased at the wrist, in nine cases out of ten it will prove successful, especially if the colour of the blood change from black to red, if the pulse get up, and the spasms be relieved.

Whilst I consider it a point of great importance to remove the oppression of the system by the abstraction of blood, it must not be imagined that this means alone will cure the disease. There are

other aids also essential. The object of bleeding is to remove venous congestion and spasm; to relieve the heart and lungs from oppression, and to check the most urgent and distressing symptoms; and without this be in some measure attained, all our efforts will prove fruitless: but this having been once accomplished, the disease is brought into a manageable state, though it not unfrequently happens, that our most active efforts are afterwards required to remove a very opposite state of the disease, nearly as dangerous as the former, occasioned by the reaction which occurs, under a state of system unfavourable to its development.

Opium has been recommended, and generally used in large quantities; but I have seen very little good arise from it: on the contrary, I have often thought that there was generally a greater determination to the brain, and a much greater degree of stupor, where opium had been given and depended upon. On this account, I very early discontinued its use, and latterly never gave it under any circumstances in epidemic cholera, except in combination with calomel. In general, I used camphor, ammonia and æther, in combination, giving it every ten, fifteen, or twenty minutes, according to circumstances.

Rubefacients I have always used, with decided benefit, spirits of turpentine as an embrocation, for spasms of the extremities, &c.; and I have applied sinapisms to the legs and soles of the feet, and sometimes covered the whole trunk with them, from the clavicle to the pubis. I have also applied blisters occasionally, but I think sinapisms act more quickly and more certainly on the skin, and for this reason, I have generally resorted to them in preference. It was not at all uncommon to see these applications fail altogether in producing any effect upon the skin; and in many cases, even where an effect was produced by blisters, there was nothing like that healthy discharge which we see proceeding from them in common diseases.

Warm and Vapour-bath.—The warm-bath, I am of opinion, did more harm than good in epidemic cholera. The fatigue arising from going in and out of it, and from rubbing and dressing the patient, always exhausted him; and when neither rubbing nor dressing was attended to, and when the patient at once was taken out of the bath, and wrapped in blankets, I think mischief was done by the blanket, thus moistened, being kept upon him. I never resorted to this treatment in cholera above two or three times, and subsequently not at all. The vapour-bath is better, if the heat could be regulated; but it cannot, and it is both too sudden and too intense. I

have never seen any advantage obtained from it. A well-regulated sand-bath might be exceedingly useful, but I am not aware that it has ever been tried. I have found infinitely more benefit arise from the application of warm dry flannels to the surface of the body, than from any other application of this description; and it was the remedy invariably used in my hospital, after I had satisfied myself of the inutility of warm and vapour-baths.

Nitric-acid Blister.—A nitric-acid blister has been strongly recommended, and I have given it a full trial. It produces severe smarting of the skin, but I have never, in any instance, seen vesication produced by it. Whenever the acid acted upon the skin, it always made an *eschar*, but raised no blister; I had consequently no confidence in it.

Boiling Water.—Scalding water has been recommended as a blister. I certainly think it more likely to be useful than the nitric acid. I have heard of good effects being produced by it, but have never used it myself.

Of all the foregoing applications, I have depended most upon the common blister, the mustard poultice, and the warm flannel applications. The following is the way in which this disease has usually been treated under my direction:—A patient is admitted into the hospital, I shall say at noon, with all the symptoms of cholera; a vein is immediately opened, and one scruple of calomel and two grains of opium are given in the form of a pill, and followed by a camphor draught. The body and extremities are well rubbed with dry flannels made hot, and bottles filled with hot water are applied to the feet and hands; but if the spasms are severe, spirits of turpentine are used as an embrocation. In an hour, the effects of these remedies, are perceptible, and whether the disease be in any degree arrested, or in progress. If the former, nothing more is to be done till evening, when the calomel pill may be repeated, and an enema exhibited. The following morning the bowels should be again fully evacuated, and then the patient may be considered safe.

When blood, however, cannot be drawn from the arm, and the spasms continue; when severe pain and burning heat are felt at the umbilicus and scrobiculus cordis, when the skin is cold, and deluged with cold, clammy dew; and when there are oppression in the chest and difficulty of breathing—excessive pain and confusion about the head, with great intolerance of light—no pulse, or a pulse scarcely to be felt, and a cadaverous smell from the body, twenty or thirty leeches should be applied immediately to the umbilicus and scrobiculus cordis; the calomel pill should be

repeated, and the turpentine embrocations continued. Leeches ought likewise to be applied to the temples and base of the skull. When they bleed freely, their application is always attended with decided advantage, and they should be allowed to remain till they have fulfilled their duty; after which, a large blister or sinapism should be applied over the whole abdomen. Sometimes the leechés fasten, but do not draw blood. In this case they should be removed immediately, and the sinapism or blister applied in their place. When the bowels are very irritable, and constantly discharging a watery fluid, small anodyne enemas, with camphor, may be given; and the *drogue amère*, a nostrum used by the Jesuits, will be then found very useful in assisting the operation of calomel, which latter should always be repeated every two hours, till three or four scruples have been taken.

Whenever we fail in checking the disease at first, we have no resource but to treat urgent symptoms, and they must always be met with decision as they occur. The patient ought never to be left a moment without an attendant who is capable of acting according to circumstances, and who may take advantage of every change.

An opportunity sometimes offers in the advanced stage of the disease to abstract blood: this is indicated by a struggle or effort of the circulating system to overcome some resisting power, and is a most auspicious symptom, which should never be overlooked. This reaction indicates that the constitution is making an effort to restore the circulation, but is unable to do so till assisted by the abstraction of blood, which abstraction aids in removing that oppression which it has not power of itself to overcome. This is a point, in the treatment of epidemic cholera, of the greatest importance, and the change in the circulation indicating the propriety of adopting and the time of performing it, should always be expected and taken advantage of as soon as it occurs.

In this manner the treatment proceeds, sometimes with evident signs of success, at others, without the least impression being made upon the disease. A very few hours, however, will develope what we ought to hope for, and even to expect, viz., a favourable change. This is always accompanied by relief from the bowels, in the form of a blackish, grey, feculent, and tenacious discharge. Whenever this takes place there is hope, and the exhibition of calomel should be followed up with a smart purgative, if the stomach will receive it; if it will not, an enema should be administered, and repeated till motions are procured. The purgative I have generally found

to answer best at this stage of the disease, and to sit most lightly on the stomach, is a draught consisting of half a drachm of the compound powder of jalap in two ounces of peppermint water, and, as it is a matter of the very first consequence to act upon the bowels freely as soon as possible, if this draught have no effect in two or three hours, it should always be repeated.

Urine is neither secreted nor passed during the continuance of this disease; whenever it appears, which it frequently does with a full and free discharge from the bowels, the occurrence is always favourable and satisfactory.

Twelve or eighteen hours generally terminate this disorder either one way or the other; but, when we succeed in overcoming it, the greatest attention and care are required, to preserve the patient against the effects of that general disturbance which the constitution has suffered in the attack. The whole system is shaken to its foundation, and the organic functions are so deranged, that I have known instances of men lingering in bad health for many months, while every care was taken of them, although they had been perfectly well to all appearance not many hours before the attack; and, indeed, I have seen some who have not recovered, and never will recover, from its effects.

The subsequent treatment is now to be considered, and the indication in this stage is to guard against congestion in the abdominal and thoracic viscera, and in the brain; each of which suffers in a greater or less degree, and sometimes the whole are attacked at the same time. There are generally observable, in the advanced stage of the disease, an unusual stupor and heaviness of the patient, and at times an obstinate sullenness that is exceedingly annoying; because, when such symptoms are present, it is with the greatest difficulty we can get answers to questions, and consequently we often act in the dark, from the want of information beyond our own personal observation, which will not serve us upon all occasions. Patients affected with these symptoms seldom or ever complain of pain; but, on examining the abdomen, a very great fulness and doughy feel is generally found all over it, as if the intestines were completely overloaded and the viscera enormously congested; pressure made upon the liver obliges the patients to shrink from it, and show symptoms of uneasiness, though they positively and obstinately assert that they have no pain. The eyes are sometimes peculiarly bright, with contracted pupils, and there is an evident intolerance of light; yet these patients insist that they have no uneasiness in the head, and that they can look at the light with perfect

ease. The pulse is often oppressed and labouring, notwithstanding a very large quantity of blood may have been taken during the first stage of the disease. These are symptoms that require immediate attention, and, when urgent, blood should be taken from the arm; but, in general, leeches will answer every purpose, and I consider them a safer remedy in this stage of the disease than general bleeding; because they appear to me to empty the large trunks through the capillary vessels, and aid in regulating the circulation, without destroying power—a point of great importance where the constitution has already suffered so severely. This practice may appear too bold to some who have not observed the frequent or decided adoption of it in this disease; and more particularly to those in India, who have a deep-rooted aversion to depletion of any kind, under the mistaken notion of its producing debility, and not discriminating between oppression and debility. The practice, however, has been proved, by no limited experience, to be successful in the cure of this disorder. The symptoms rendering it necessary require a watchfulness and discrimination as they are seldom complained of by the patient. A minute examination of the patient is particularly necessary in the treatment of epidemic cholera—a malady in which the sensibility appears to partake largely of the general disturbance of the system, and where the patient seems to be perfectly indifferent about his fate.

When the patient shrinks from pressure on the abdomen, leeches should be placed over it in considerable numbers, and particularly in the neighbourhood of the liver; and, when the head is affected, they should be applied at the temples and base of the skull. I prefer the latter situation, and I think I have observed greater advantage to arise from their application on this part, than when placed on the temples.

Purgatives are to be employed in aid of the above remedies, but the congestive symptoms ought to be overcome, before we can adopt any regular plan of treatment to re-establish the general health. Whilst the symptoms of oppression and congestion require the most minute attention, we must not lose sight of the condition of the secretions of the small intestines, and of the alvine discharges. Though the irritability of the stomach sometimes continues till a very late period, yet in general it is subdued early, and that organ retains all that is taken, both as medicine and nourishment: but as the whole line of the small intestines exhibits, on dissection of fatal cases, a most peculiar appearance, from the duodenum to the cæcum; as the bowel itself is very much contracted in its diameter, thickened,

and pulpy in its appearance; and as, when laid open, it is found filled with a cream-coloured, thick, viscid, and tenacious matter, exactly like old cream-cheese, which glues the gut together, and obstructs its passage; and, moreover, as this matter is to be found in every fatal case of cholera, so it may be inferred to exist in some degree even in all that recover; and therefore the removal of it must be a primary consideration. Purgatives do not seem to act upon it at first, as they merely produce watery dejections: so long, therefore, as this state continues we may be sure that all is not right, even although the evacuations be reported copious and free. They should always be examined with great care: for until the above-described matter is brought away, I never consider much advancement to have been made in the cure.

Calomel, in scruple doses, I have always found most useful in removing this particular vitiated secretion. Sometimes I have combined it with aloes, and continued it every night and morning, till the dejections became of a blackish grey colour, substantial and tenacious. The purging draught and the enema may then be had recourse to, with the best effects. This practice was followed up regularly every day with leeches, blisters, &c., according to circumstances. In a day or two the motions were usually observed to become dark green, which colour always indicated an approach to healthy action. The calomel and purging draughts were still continued, however, for five or six days longer, till the dejections became more natural, and a visible improvement was observed in the appearance of the patient. He was then put upon an alterative course of medicine for a month or more, according to circumstances. This latter measure is absolutely necessary to prevent a relapse, which is very common, and always dangerous. I have frequently witnessed, both in this and in other diseases, where men have been returned to duty before the organic functions were restored to healthy action, a state of disease produced, which, if it did not affect their lives, disqualified and rendered them unfit for service, before they had been many years in India.

This plan of treating the epidemic cholera, which was adopted in the general hospital at Madras under my charge, during the prevalence of that disease from 1819 to 1823, was attended with a success that certainly far exceeded my expectations, and I shall, therefore, here enumerate the phenomena which directed my indications of cure, and by which I always regulated the subordinate details of the treatment:—1st. The general symptoms of a congestive state of the brain, heart, lungs, liver, and abdominal viscera. 2dly. The

black and thick state of the blood, and the presence of venous coloured blood in the left auricle and ventricle, and in some of the arteries. 3dly. The singular vermilion tinge upon the upper part of the small intestines; and the dark venous vascularity of the lower part of the ileum. 4thly. The peculiar viscid, tenacious, cream-coloured secretion and accumulation in the intestinal tube, which sometimes not only filled it, but actually glued it together. 5thly. The change of the colour of the blood, from black to red, while flowing from the arm; and the success of venesection in checking the disease, indicated by this change. 6thly. The favourable change which always followed dark, grey-coloured, and viscid dejections. 7thly. Dark green motions, succeeding to the above-characterised motions, and the indication which the former furnished, viz. an approaching return to healthy function. 8thly. Collapsed state of the bladder, and want of secretion of urine, and its secretion and appearance always proving favourable.

These were the circumstances of the disease I always kept in view in treating cholera, and I never lost sight of them throughout the cure. My object was to remove congestive symptoms, and to effect the discharge of the viscid matter from the bowels. Bleeding, both general and local, antispasmodics, æther, ammonia, and camphor, with stimulating external applications, effected the first; and calomel, with aloes, the latter. I have often thought that much benefit was derived from the *drogue amère* already alluded to; and the warm gums composing it certainly appeared to be useful in aiding the calomel in removing this matter from the intestines; and therefore I often gave it with calomel, in doses from half an ounce to one ounce mixed with the camphor draught, and I was confirmed in the opinion, by appearances and by examinations after death; where I observed, in some cases, that the viscid matter had been carried half down the ileum, leaving the upper part of the canal completely free from it. The vast accumulation of this matter, and its uniform presence in all cases of cholera, in addition to the difficulty of removing it, led me to believe that relapse was frequently occasioned by its continuance in the bowels, even after the circulation had been restored; and therefore I considered its removal as a primary object, because it must be evident, that where the intestine is lined with such viscid matter, there must be a constant irritation kept up, and the action of medicines upon the living fibre interrupted.

Observing, even after the congestive symptoms were overcome, that little progress was made in the cure, till blackish grey, and,

subsequently, dark green, viscid dejections were procured, I was anxious to see what effects could be produced upon the secretions of the stomach and intestines, by bringing in contact the various medicines used in cholera with the secreted matter. With this view I removed a considerable quantity of this matter from the intestines of a fatal case of cholera, where it was found in considerable quantity, and made a deliberate and patient trial in the presence of several medical men, who were doing duty with me in the hospital. The following were the results:—

1. The secretion itself was concentrated, cream-coloured, or greyish yellow, like healthy pus. When mixed with alcohol, it formed a number of discrete coagula, minutely divided; colour unchanged or ochry.

2. Ammonia, æther, and camphor produced no alteration whatever upon it.

3. Diluted nitric acid, precipitated it in small flocculi; tartaric acid in solution, and in considerable quantity, completely dissolved it, and rendered it perfectly fluid.

4. Cystic bile dissolved it sensibly, the mixture being intermediate in colour between the two.

5. Calomel mixed with it in small quantity, formed a dark greenish grey, precisely similar to the dark grey dejections already mentioned, and appeared to dissolve it.

6. Calomel and cystic bile, combined, rendered it more fluid, and produced a dark green colour.

These experiments were repeated as often as opportunities occurred, but without removing the secreted matter from the intestines, and the results were invariably the same; the conclusion, therefore, which I draw from the foregoing facts are—

1. That tartaric acid is the most useful drink, from its dissolving the matter.

2. That calomel unites with, and separates this viscid matter, and produces those black, grey dejections which precede recovery, and which are unaided by, and unmixed with bile.

3. That the green dejections which succeed to the former, arise from cystic bile and calomel, in combination with this matter.

These experiments have thrown a new light upon the treatment of cholera; and in all cases which came under my care afterwards, the principles indicated by them were observed and followed. Lemonade was given as common drink, which was always peculiarly agreeable to the patient; calomel, in full or scruple doses, with *drogue amère*, was repeated boldly and with confidence: and when

the congestive symptoms were once overcome, and the circulation restored, the subsequent treatment became simple and certain.

When I saw dark grey dejections, I considered that the calomel was doing its duty; and when I found them change to green, I felt satisfied that the biliary ducts were emulged, that bile had commenced to flow, and that all was safe.

It must be remembered, and I cannot repeat the caution too often, that in every instance the strictest vigilance is necessary; the medicines should never be discontinued, till healthy secretions are produced; and even after they have been produced, laxatives and alteratives should be taken daily, for at least a month after the patient is considered perfectly recovered.

The urine seldom flows freely till a day or two after these viscid, tenacious dejections have passed of: this is a symptom that should never be lost sight of, as the patient cannot be considered quite safe till this excretion is re-established.

The effects of calomel, lemonade, tartaric acid, and cystic bile, on the secretions of the intestines, seem to be deserving of attention in the treatment of fever, and many other diseases.

In common with most other medical men, I had a horror of this disease, from the various reports which I had received of it, and the unsatisfactory account given of its treatment. The instructions, too, derived from superior authority, were so vague, that it was impossible to draw any rational conclusion from them. Magnesia and milk, burnt cork and castor oil, were in their turn recommended as specifics. With such information I really felt at a loss how to treat the first case that came under my care; and my attention was consequently directed to the treatment of symptoms alone, till experience soon taught me, that to remove congestion, and restore the balance of circulation, were the first indications of cure; and that if these were attended to in the early stage of the disease, it became as manageable as most other acute diseases. I likewise soon discovered that many of the notions which had gone abroad, and which had been strongly inculcated, were erroneous: for instance, to drink any thing cold was supposed to be attended with direful consequences. This is the reason which induced me, at first, invariably to give warm brandy and water and rice-water, though actually loathed by the patient. This loathing of warm fluids on the part of the patient was such as could not have escaped the attention of the most common observer; for, although the patient appeared to be dreadfully distressed by thirst, and was always calling for cold

drink, yet, when any thing warm was presented, he put it from him with disgust.

To consult the dictates of nature in the treatment of disease, where there is no decided and manifest objection, can never be wrong; and, as I saw no good reason why warm drinks should be exclusively essential in this disease, more especially as there was so strong a predilection for cold drinks on the part of the patient, I resolved to step out of the beaten path, and gave my patients the nitric acid agreeably diluted. I was gratified to find that it had no bad consequences, but that it was a most pleasant beverage to the patient, relieving that most distressing and urgent symptom, the burning sensation at the stomach.

Fifty-nine cases of epidemic cholera were treated by me in the general hospital at Madras, from the 23d of May till the 23d of August, 1819; of which number fifteen died, nearly one in four, as the following statement will show:—

From the 23d to 27th May . .	10	were admitted . .	5	died.
1st to 23d June . .	15	ditto . . .	6	do.
3d to 5th July . .	6	ditto . . .	1	do.
7th to 23d August .	28	ditto : . .	3	do.
	59		15	

In the cases where recovery took place, the disease was met at an early period; and in those which terminated fatally, four, five, and six hours had elapsed from the first attack, before medical assistance was had recourse to. From this fact it appears probable, that, if the disorder be taken at an early period, it would be as manageable as any other acute disease; but the rapidity with which it runs its course, requires the most active and energetic measures to check it, and the loss of an hour may cause the loss of a life!

BOOK V.

ON THE FEVERS OF INDIA.

Fevers are the most prevalent diseases in warm climates, and, in many places the most destructive. In some parts of the East Indies, however, particularly in the districts under the Madras Presidency, the mortality amongst Europeans is much greater from dysentery than from fever; but the comparative prevalence of, and mortality from, fevers and dysentery, as respects the East generally, depend so much upon locality and various fortuitous circumstances, that no positive statement can be offered on the subject. Although results may vary in different places in India, the number of deaths from fever will at least equal, if not exceed, that from dysentery; whilst the proportion of deaths in those labouring under dysentery and fever respectively, will, in almost all situations, be greatest in the former disease, unless during the epidemic prevalence of fever of a very malignant type. In the western hemisphere, the much greater prevalence and fatality of fever than dysentery are extremely manifest.

The types or forms of fever which are met with amongst Europeans resident within the tropics are very various, either as they present themselves in the eastern or in the western hemisphere. But the varieties can scarcely be said to amount to specific differences; and, in respect of the eastern hemisphere especially, it may be affirmed that the differences which they present in their characters are entirely the result of the activity, intensity, and combination of their exciting causes, conjoined with the predispositions of those affected.

I have never remarked any appearance of fever from a specific or contagious source in India; and, although believing in the influence of infection as respects the continued adynamic fever of temperate climates, I have, during an experience of thirty-seven years in India, never observed fever to proceed from contagion in this part of the world. The fevers, therefore, of India, and I be-

lieve in warm climates generally, are the effects of exhalations from the soil and vicissitudes of season, the former especially, upon predisposed constitutions; and the types and forms which these fevers assume are entirely dependent upon the activity of their causes, in relation to the condition of their subjects, and various collateral circumstances occurring about the time of their invasion.

Fevers, in India, vary in every possible grade and form, from the slightest febricula or ephemeral attack to the most malignant type, characterised by extreme exhaustion of the vascular powers, by a yellow tinge of the surface, and vomiting of matters having a dark-coloured and grumous appearance.

CHAPTER I.

ON THE PATHOLOGY OF FEVER.

THE fevers which occur in the eastern hemisphere, generally present, in one period or other of their course, a determination or more marked affection of some particular organ or texture. I must not, however, be understood to regard the local affection as the cause of fever, but rather that it is a consequence of it, from the predisposition of the part to become diseased. The complications which thus arise in the course of fevers in warm climates may be owing also to the nature of the causes which occasion them, as well as the temperature of the atmosphere, the habits and modes of living of those affected, and the period which they have passed within the tropics.

In a large majority of these fevers, vascular excitement is a prominent character in their early stages; but it exhausts itself sooner or later, according to its violence, to the causes which occasioned it, and the habits and constitution of the patient; and is followed by collapse, presenting all the diversities of grade, form, and duration, of the antecedent excitement, and having a due relation to such excitement on many occasions; whilst on others, no such relation, at least as respects degree, is observed, in some cases the subsequent collapse not being remarkable, although the previous action has been high—and in others the exhaustion being extremely great, although the febrile excitement has been but slight and imperfectly developed. In the one form of febrile action, it would seem that the causes of fever, acting upon a sound and but slightly predisposed, although susceptible, frame, brought about active excitement of the vascular system, without much exhaustion of the powers of life; whilst in the other form of disease, the activity and combination of causes acting upon a highly disposed and weakened constitution, overwhelmed its energies and rendered them unable to manifest that healthy reaction which, in the majority of cases, if not allowed to run too high, or seriously to affect a particular organ, is productive of salutary effects.

In treating this subject I shall *first* offer some observations on

the exciting and predisposing causes of intertropical fevers; *secondly*, on their various types and forms; and, *thirdly*, on their complications and terminations, and on the appearances observed upon the dissection of fatal cases.

SECT. I.—*On the exciting and predisposing Causes of Fever in India.*

The most influential of the exciting and predisposing causes of fever having been already fully discussed in the sections embraced under the "*General View of the Causes chiefly productive of Disease in Warm Climates, particularly in India,*" I shall here advert merely to a few of the more contingent or occasional causes which usually co-operate with those already treated of in producing diseases of this class.

Amongst the most influential predisposing causes of fever in recruits and individuals arriving in India, are the full salt diet and allowance of spirituous liquors provided for them on the passage to that country. The frequent want of attention also to the state of the bowels, and the consequent accumulation of morbid matters in the *prima via*, are also circumstances not without their influence in the production of fever as well as of dysentery, especially in disposing the system to the invasion of its more energetic exciting causes. The incautious exposure which many new comers to the climate commit, and the intemperate habits of some leading to still greater imprudences of this kind, have an extremely baneful effect upon the European constitution, at a time when it is naturally liable to disease, from recent migration to a hot from a cold climate.

When speaking of the causes of hepatic derangements, especially of an increased secretion of bile, I showed that the influence of high atmospheric temperature, especially when the air is loaded with terrestrial exhalations, is to diminish those requisite changes which the blood undergoes in the lungs, and to furnish a larger proportion of those elements from which bile is formed to the actions of the liver; and hence, that this fluid is generally secreted more abundantly, and, perhaps, of a more stimulating quality. This circumstance appears to account for the prevalence of hepatic diseases, in proportion to the elevation of temperature, and to the bilious character which fever so very frequently assumes within the tropics generally, as well as in India. Other circumstances, doubtless, co-operate with this in the causation of febrile diseases in

warm climates, and in forming the types and characters which they present. Of these I shall have to treat more fully in the sequel; but I may here mention, as a very powerful predisposing cause of fevers generally, the plethoric and phlogistic diathesis of the majority of those who proceed from Great Britain to our Indian possessions, which is generally heightened by the circumstances in which they are placed, and the modes of living they enjoy on their passage from England.

The indulgences also of soldiers and sailors in the use of spirituous and inebriating liquors are extremely productive of febrile diseases, not so much from exciting a febrile attack, for this is seldom observed as a direct consequence, but from the predisposition it creates in the individual of being affected by the more energetic causes of fever, and by the exposures to which habits and indulgences of this kind very generally lead. I should not have directed so much attention to this almost self-evident proposition, if I did not believe that the bad effects of intemperance are considered by many persons as of little importance amongst the list of causes of intertropical diseases. It is probable that an indulgence in wine or spirituous beverages during the temporary prevalence of the chief causes of unhealthiness in a warm climate, provided that it never exceeds the verge of sobriety, may fortify the system against the invasion of malaria, and exposures to night-chills and fogs; but the excitement thus occasioned requires to be kept up moderately and equably, never to reach above a certain pitch, nor fall much below it. Thus regulated, the exciting causes of fever may sometimes be counteracted at periods of their greatest prevalence, or during temporary occurrences of epidemic disease. But can indulgence in habits of this description be so regulated? or do instances occur, amongst those who thus habituate themselves, of regular and undeviating excitement, — never rising beyond sobriety nor sinking into collapse? I have not seen such instances, and I believe they seldom or ever are met with. Moreover, if they could possibly occur, the practice would inevitably be followed, in a longer or shorter period, by visceral disease; and the individual who should take this way of shunning one malady would fall into another, although more distant, yet much more dangerous, as respects its final issue.

Next to the influence of intoxication in disposing the system to the inroads of the exciting causes of fever, is extreme fatigue. Soldiers and sailors, the former especially, during active service in the field, are often liable to suffer from this cause, particularly when it

is conjoined with the depressing passions of the mind, and with insufficient nourishment, or food of a bad quality. Excessive exertion also, while exposed to the sun, wearing damp or wet clothes, and want of the requisite proportion of sleep, are among the most frequent accessory causes to which soldiers are subject during active service. Thus circumstanced, they are readily affected by the exhalations from the soil, and hence they generally suffer greatly from fever and dysentery; and if they be kept exposed to, or cannot be removed from, those causes, and are, moreover, subjected to night-chills, to fogs, and moisture, during the progress of disease, malignant symptoms and sudden collapse of the powers of life generally supervene, and a fatal termination takes place in a large proportion of those affected.

In all speculations respecting the causes of fever, a certain share of influence should be imputed to the habit of body and the temperament of those affected, and viewed in relation to the exciting causes, and those collateral and contingent circumstances which accompany them. The same causes which produce continued fever in one person will often occasion an intermittent in a second, or a remittent in a third; the type of the disease being the effect of the habit, diathesis, and predisposition of the patients, together with the activity and combination of the exciting causes. That this is the case is evident from the operation of the same agents upon large bodies of men, differently circumstanced as respects habit of body, temperament, and the time of residence in a warm climate. Amongst the plethoric, sanguine, and those recently arrived in the country, the disease will be continued and possessed of high inflammatory characters, frequently with local determination; whilst in the long residenter, the disease will assume a remittent or intermittent type, either in their simple or complicated forms, according to the activity of the exciting causes, and various other circumstances, acting internally or externally as respects the patient, and having a certain influence, although not of a precise or uniform character.

Amongst those causes which seem to modify the character of fever during its progress, and occasion local determinations of vascular action, or excess of disease in a particular organ or texture, there are perhaps none more influential than the previous habits and constitution of the patient. In those addicted to intoxication, the liver and bowels generally evince the most marked signs of disease; whilst in the plethoric and robust, vascular determination of blood to the head and its consequences are the most remarkable. Of other consequences frequently resulting from, and attendant upon,

intoxication, I may allude to the exposures to the sun and to the night-air to which it so frequently leads; the exhaustion of the nervous energy, and dyspeptic state of the stomach which it uniformly induces; and the effects usually produced by it upon the moral and physical constitution of the individual. Exposures to the sun are, under all circumstances, injurious but especially so when the system is affected by the spirituous and intoxicating liquors in which soldiers and sailors indulge in hot climates. The subsequent collapse also which always follows a day of excitement from this species of indulgence, generally takes place in the early part of the morning, when the exciting causes of fever are most concentrated; and hence their effects cannot fail of being fully produced, as the constitution is the most favourably disposed to their invasion. During the night and morning, the dews and fogs saturated with terrestrial exhalations load the atmosphere; and whoever respires the air thus fraught with the exciting causes of fever, in a state of predisposition from previous exposure to the powerful rays of the sun, from fatigue, or from the exhaustion following excitement of any kind, will generally become affected by them.

Excess in the quantity of food, as well as the use of inebriating beverages, also disposes the system to the influence of the external agents of disease. Both habits are productive of a dyspeptic state of the stomach; and when the digestive energies are weakened, in whatever manner this may be occasioned, the strongest defences against the invasion of disease are thrown down. When the functions of digestion lose their activity, mental energy frequently becomes lowered also, and despondency is not an unusual concomitant. Of all the influences which act upon the system in disposing it to the injurious impression of the external agents of fever, there are none which act more surely than those which originate in itself, operate internally, and oppress the passions and affections of the mind. Of these, the fear of disease, especially of fever, despondency, grief, anxiety of mind, vexation, disappointment, or whatever tends to lower the mental and vital energies, are amongst the most remarkable.

Although atmospherical vicissitudes are not often themselves the active agents of fever, yet they are powerfully influential in favouring the generation as well as the operation of the more immediate causes, and in determining the type, form, and severity of the disease, which must be viewed as proceeding in a more direct manner from the exhalations of the soil itself, or of the organised remains which cover it, than from other agents. But whilst I con-

sider atmospherical vicissitudes as performing a secondary part in the causation of fever, let it not be understood that I view that which is performed by them as being of little importance. Whether as respects endemic or epidemic disease, the influence of atmospherical changes is most powerful, and is exerted in a three-fold manner. *First*, they assist in the generation of those exhalations from the soil which I have shown to be the chief causes of intertropical fevers; *secondly*, they give them activity, by enabling the atmosphere to be the vehicle of their conveyance; and, *thirdly*, they dispose the body to their operation. Thus a hot, moist, and stagnant state of the air, following heavy rains, which have been consequent upon an unusually long period of drought and of high temperature, is generally productive of endemic disease, sometimes to so great a degree as to assume an epidemic character, especially in situations where the sources of malaria exist. Here the influence of atmospherical vicissitudes is sufficiently evident, as respects the generation of miasmata, its suspension in a moist, stagnant, and close atmosphere, and the predisposing operation of heat and moisture upon the animal frame.

The great influence which changes of season exert upon the prevalence and form of febrile diseases, is very apparent in India. Such changes are nothing more than atmospherical vicissitudes; certain peculiarities of weather continuing so long as to constitute a season, but each change being followed by effects which are visible in the appearance of the human species, and in the character of their disease. Thus, nearly in all parts of India, the first rains which follow the hot and dry season are productive of remittents, bilious fevers, &c., according to the habit and constitution of the patient. During the rainy and cold seasons, intermittents and dysentery are prevalent; and during the hot seasons, fevers of a continued type are most frequently observed. In all these forms of disease, terrestrial exhalations or noxious miasms, are the chief exciting causes, the atmospherical vicissitudes acting conjointly with a determinate degree of energy of the exciting causes, and with the habit, constitution, and predisposition of the individual, in forming the type and character of the disease.

But vicissitudes of season and of weather, during any particular season, act not only in the very direct and obvious manner now pointed out, but they also affect the natives of the soil especially, in a more indirect manner, chiefly by influencing the productiveness and quality of the crops, upon which they are chiefly dependent for nourishment. The effects produced in this

way by the nature of the seasons can scarcely be estimated to their full extent, except by those who are well acquainted with intertropical countries. There are no causes more influential than a scarcity of nourishment, and food of a bad quality, in disposing the system to the effects of noxious exhalations; and it generally happens that the weather, which is most injurious to the productions of the soil, and to the collecting of them in their due state and season, is also most calculated to promote the generation of such exhalations, and to favour their operation on the human frame.

Fevers, which are usually only endemic to certain places, not unfrequently become epidemic under circumstances like the above, and are aggravated in character, owing both to the greater intensity of the causes thus generated, and to the increased predisposition of those affected. During famine and defective crops, the body is not only insufficiently nourished, but the quantity of nourishment afforded is generally of an improper and even hurtful quality. Hence the greatest debility is occasioned, and predisposition to fever is thereby heightened to a proportionate extent, upon the slightest exposure to any of its exciting causes.

Although fevers, owing to the wide diffusion of the above causes, frequently assume an epidemic form, yet it must be admitted that they are occasionally epidemic without these or any other causes of an evident or appreciable kind being present: here we must ascribe them to some constitution of the air which we cannot recognise otherwise than by its effects upon the animal economy. There can be no doubt that the usual causes of disease, especially those which proceed from the soil, and from the body itself in a state of disease, —in short, all emanations from dead and living organised matter, make a more than usually strong impression upon the frame, during the prevalence of epidemic influence in the air; but whether this activity is the result of increased quantity or intensity of the cause, or greater predisposition of the individual, or of both conjoined, it is difficult to ascertain. It is most probable that the constitution of the atmosphere, whether it consist in a certain state of its electricities or not, tends to augment the quantity and intensity of the causes of fever, while it predisposes the system to their operation. This seems to be the whole amount of our knowledge,—its utmost extent; and beyond it nothing can be advanced but vague hypothesis and speculation.

The question of epidemic influence can scarcely be agitated without bringing under consideration the nearly associated subject of contagion. Emanations from bodies affected with fever, especially

in a warm, moist, close, and imperfectly ventilated situation, will induce fever in those predisposed to its invasion, particularly during the epidemic prevalence of the disease. I do not deny that fever has been propagated in this manner in warm climates or in India; for I am well aware of the difficulties which beset even a fair and unprejudiced consideration of this but too often intemperately and unphilosophically discussed question. But I may state the result of my own observations, and of my own conviction upon the matter —the result of what I have seen and thought with an unbiassed mind. Although I have admitted that fever, and even dysentery, may diffuse themselves, under circumstances similar to that stated above, in India or any other warm climate; and although I believe that they are so propagated in temperate climates, during circumstances favourable to the generation of a noxious miasm, and when it operates on predisposed persons, yet I never observed an unequivocal occurrence of the kind in any part of the East. The circumstances in which the sick are placed in a warm climate, and the free ventilation which is constantly preserved in the hospitals, and in the apartments of the diseased, are, perhaps, the principal reasons that can be adduced for this exemption from one of the chief causes of fever, especially amongst Europeans resident in a warm climate.

Amongst the natives, when fever occurs either in endemic or epidemic forms, the causes are generally so obviously connected with emanations from the soil, defective crops, vicissitudes of season and of weather, and generally act so uniformly upon all affected by disease, that the active agency of these causes cannot be denied; whilst fever seldom or ever extends beyond the sphere of those causes, and when it does, it cannot be unequivocally assigned to contagion, inasmuch as there are abundant sources to account for its occurrence, in the locality and circumstances of the soil, or of parts of the country visited by the person affected. It is possible, however, that want of personal cleanliness and of ventilation, apartments crowded with sick, and close dirty streets, may promote the generation of a noxious miasm, which, acting during the epidemic prevalence of fever, and in conjunction with causes proceeding from the soil, upon a predisposed frame, may produce fever of a malignant nature; and that, under such circumstances, which will but rarely occur amongst Europeans resident in warm climates, infection to a certain extent will be present, and in such a manner as to furnish plausible arguments to the espousers of both sides of this keenly contested question.

When the natives of India are sick, they invariably confine them-

selves in small unventilated apartments; and sometimes they have charcoal fires in their rooms, which render them insufferably hot and suffocating. This practice is doubtless destructive of life; and if several persons were confined in a single apartment, or even in a house so circumstanced, it is easy to conceive that the air in it would be rendered so impure as to generate disease in those who should respire it, with a predisposed state of system. I believe that this circumstance combines with endemic and epidemic causes in promoting the prevalence of fever amongst the natives; but as it has no existence in respect of Europeans, it cannot be considered as influencing the prevalence or progress of diseases among them.

The majority of instances of unusual prevalence of fever in India, particularly amongst the natives of the country, have been consequent upon heavy falls of rain, excessive moisture of the earth, and a damp state of atmosphere—circumstances manifestly productive of copious exhalations from the soil when acted upon by an intertropical sun. During more than usually heavy falls of rain, situations not formerly inundated are placed under water, and much of the vegetable and animal remains covering the high grounds and decaying in the woods and bushes, are washed into the tanks and low places, leaving the more level plains, especially those surrounding large tanks and skirting the banks of rivers and streams, at the end of the rains covered with a dense coating of slime, consisting chiefly of animal and vegetable matter mixed with fine dust and clay in a state of putrefaction. This does not fail of tainting both the moist and stagnant atmosphere, and the water preserved in the tanks for the use of the inhabitants; and if, in addition to their other effects, heavy falls of rain have injured the crops, the systems of the natives are disposed, from this circumstance, to the invasion or the miasms which thus infect both air and water. The native doctors, who are frequently men of keen observation, and unprejudiced by doctrines of contagion or non-contagion, generally explain the prevalence of fever in this way, without calling in the aid of infection; and when they cannot explain it by such physical agencies, the operations of some evil spirit are the sources to which they impute the calamity.

Although debility, or exhaustion of the powers of life, dispose to certain forms of intertropical fevers, especially to intermittents or remittents, or low continued fevers, yet early age and the prime of life, particularly in the male sex, and when connected with the sanguine, irritable, and bilious temperaments, and plethoric habit of body, predispose to attacks of bilious, inflammatory, and the more

continued forms of fever. Childhood, the female sex, and advanced age, are remarked as furnishing some degree of exemption from the fevers of warm climates, in their more continued and dangerous forms.

Before concluding this part of my subject, I must express my belief that the doctrine so warmly contended for by Dr. Balfour, respecting sol-lunar influence in the production of fevers, and in occasioning relapses, is founded in a correct observation of the phenomena connected with the causation of these diseases. My own observations have tended to confirm the doctrine, and I have always found it requisite to conform my practice to it, especially during convalescence from febrile diseases. How the lunar influence is excited, and why it should have relation to periods of full and change, I cannot pretend to form any opinion farther than to suppose that it is through the medium of atmospherical vicissitudes, which are more marked at these particular periods, and to the greater rise and fall of the tides on the sea coast, influencing the states of the marshy grounds and banks of rivers in the low districts of country skirting the sea-coast, and forming a large portion of the lower provinces of Bengal. Whilst, however, I admit that these circumstances may partly serve to explain the relation so strongly, and, I believe, justly insisted upon by Dr. Balfour, I conceive that they do not altogether explain it, inasmuch as the influence is remarkable in districts of the country not affected by the rise and fall of the tides, and during seasons and changes of the moon not characterised by any sensible or appreciable vicissitudes in the state of the atmosphere or of its temperature.

SECT. II.—*On the Types and Forms of Fever in India.*

Intermittent fever, in all its forms, occurs amongst Europeans resident in warm climates, and in the natives themselves. It is most frequently met with in those Europeans who have been previously the subject of the continued or remittent forms of fever, and have resided for a longer or shorter time in the country, or, in other words, who have suffered from the seasoning fever. It is most prevalent during the rainy and cold seasons, when marshy exhalations are abundant, and amongst those in whom the tendency to the inflammatory forms of fever is least remarkable, as in the spare, relaxed, and debilitated, and those who have been suffering from the continued and remittent types of the disease.

The tertian, double tertian, and quotidian, are the chief forms

which intermittents assume in India; but quartans are also prevalent, especially in cases of protracted disease, and when the intermittent form of fever supervenes to the remittent and continued type. The tendency of intermittents to change their type, frequently from tertians to double tertians, quotidians, or to quartans, and to assume irregular and complicated forms, is particularly remarkable in some countries and districts, more especially those where the sources of malaria are most abundant, and the accessory causes most numerous. Generally speaking, the more irregularity the disease presents, the greater is the derangement of the abdominal viscera with which it is complicated; for I have seldom observed intermittents put on irregular forms, without presenting evident signs of more or less derangement of the liver, spleen, and alimentary canal.

In many of the more northerly and higher districts of India, intermittent fever frequently assumes an inflammatory character; sometimes but slightly, at other times very strongly, marked. This is more evident in the quotidian and tertian forms of the disease, and when complicated with evident determination of the circulation to the liver, spleen, lungs, and head. It is necessary to remark this particular character of the disease, as it often depends upon the season, habit, and constitution of the patient, requires a modified practice, and, when not judiciously treated, often leads to serious organic disease in a short time, or runs into the remittent or continued types of fever.

Remittents of an inflammatory character are much influenced by locality and by season. In the higher districts of the country they are frequently met with, especially during the cold season, and are particularly prevalent in those who have suffered the least from the climate or from previous disease. In cases of this description, the febrile action often runs very high during the paroxysm, sometimes with delirium, at other times with marked disorder of the biliary and digestive organs.

Agues, besides presenting an inflammatory character, often furnish, particularly under circumstances of an opposite nature to those now alluded to, evidences of an adynamic or typhoid form. This generally occurs in the low marshy districts near the sea-coast, on the banks of rivers, or in the dense jungles, woods, and ravines of inland districts. During the active service which troops often undergo in the field, and in situations such as above particularised, intermittents, characterised by great debility and a typhoid form of the symptoms, are very frequently met with, either as the primary

disease, as secondary to some other form of fever, or as complicated with disorder of some internal organ, as of the spleen or liver, or both. When agues assume this form, the quartan, quotidian, double quartan, and irregular forms of the disease, are generally the most prevalent, and the intervals between the paroxysms are usually marked by symptoms of great exhaustion, debility, and deficient vitality in the frame. In these also the surface of the body evinces more serious disorder; the countenance is more anxious and squalid; the tongue more sensibly disordered; the evacuations more morbid, with greater tumefaction in the hypochondriacal regions.

The characters noticed above deserve attention, and are such as indicate the nature of the treatment which ought to be adopted. Conformably with this view, I shall distinguish this genus of fevers, in addition to the specific forms which they assume, as follows:—*First*, simple and uncomplicated ague; *secondly*, intermittents with more or less of the inflammatory character, or those accompanied with considerable arterial excitement; *thirdly*, intermittents with exhaustion of the powers of life, or with typhoid symptoms; and, *fourthly*, complicated ague, or intermittents associated with disease in some internal viscus.

Remittent fever is the most prevalent of all the forms of febrile disease occurring in warm climates. It is most frequently observed at the commencement of the rains, and during the hot season, particularly in those who have been resident in the country for some time. It assumes, according to the habit and temperament of the patient, the season of the year, and various other accessory and predisposing circumstances, operating in conjunction with the quantity and activity of the exhalations from the soil, in which the disease chiefly originates, different forms, constituting distinct varieties, and requiring a modified method of cure. The *varieties* may be generally characterised as follows:—*First*, mild remittent; *second*, inflammatory remittent; *third*, bilious remittent; and, *fourth*, malignant remittent fever, or remittents with typhoid symptoms.

The mild form of the disease is most frequently met with among those who have been exposed to the usual causes of intertropical fevers with a comparatively sound state of health, though predisposed to disease from various contingent circumstances; and occurs oftenest during the cold and dry seasons, and from similar causes to those producing intermittents.

The inflammatory remittent is frequently observed among those who have resided for a short time in the country, and those of the

longer residenters who are of the sanguineous and irritable temperaments. It is often met with in the northern and more elevated districts of India, and is not unfrequently accompanied with signs of gastric and bilious derangement, and with determination of the circulation to the head, producing considerable lesion of the functions of the brain and nervous system.

The bilious form of remittent fever is chiefly marked by the state of the skin, the pain in the forehead and sockets of the eyes, suffused conjunctiva, the highly bilious state of the evacuations, yellowish or dusky appearance of the countenance and surface of the body, the bilious condition of the tongue, bitter taste of the mouth, &c. In this form of the fever, the biliary organs are in a remarkable state of excitement, bile being found either in excess or in a vitiated condition, or both. When this fever is not removed by judicious treatment, or when the means resorted to are calculated to aggravate it, very serious lesions often supervene in the liver and alimentary canal.

The bilious remittent is most prevalent in low marshy situations on the sea-coast, banks of rivers, and thickly wooded districts in the more inland countries. It prevails chiefly among Europeans who have not been very long resident in a warm climate, and in those of a bilious or bilio-sanguineous constitution. It is very dependent upon the nature and vicissitudes of the season; and on some occasions it seems to assume an epidemic character, owing to those circumstances of season which are calculated to disengage exhalations from the soil, and at the same time to predispose the system to their operation. Thus, it is an extremely frequent form of fever during the hot months following the rainy season, especially when the previous rains have been unusually great; and at the commencement of the monsoon.

The malignant form of remittent fever is that which occurs in the most unwholesome localities, and during the most unhealthy seasons. Places most productive of malaria, when exposed to a scorching sun after heavy falls of rain, give out the noxious exhalations so abundantly, as to occasion the most marked effects upon the human constitution, especially when these exhalations accumulate in a moist and stagnant atmosphere. The effects which this state of air produces are most unfavourable to life, especially when it is associated with the various accessory causes described in the preceding section, and its operation on the frame favoured by the causes of predisposition there alluded to. Hence, remittents frequently assume more or less of a malignant form, associated in

some cases, at the commencement, with the inflammatory, in other cases with the bilious character, in various districts both in the eastern and western hemispheres; and during certain seasons and states of the atmosphere, they become prevalent in an epidemic form. This is remarkably the case with the prevailing fevers at Seringapatam, Guzeratt, Rangoon, Batavia, and in the Gumsoor country.

In this form of remittent fever, the symptoms vary very much, according to the susceptibility, habit of body, and constitution, of the patient, the concentration of the exciting causes, and the number and kind of those contingent and accessory circumstances which act in conjunction with them, and influence the disease in its progress. In some cases this fever presents, at its commencement, but indistinct remissions, the febrile action being extremely great; the skin harsh, dry, and burning, with delirium and determination to the head and biliary organs; great pain in the loins and limbs; constant sickness and vomiting of greenish yellow matter; hurried respiration; quick full pulse; clammy perspirations on the extremities; loaded tongue; bilious state of the alvine evacuations, the motions being watery, green, curdy, and variously deranged. In other cases the vascular excitement is less remarkable, and the symptoms altogether of a more typhoid kind. The delirium, instead of being marked by maniacal excitement, as in the foregoing cases, is sometimes low and muttering; the pulse small and quick; the abdomen tumid and hot, while the extremities are cold and clammy; the evacuations foul, morbid, and offensive; hurried respiration; fuliginous tongue, with aphthæ or spongy gums; frequent or constant vomiting, at first of ropy, bilious fluids, afterwards of a grumous fluid, resembling black coffee-grounds; a dark, pitchy appearance of the motions, &c. In both these varieties of malignant remittent fever, a yellowness of the surface of the body occasionally presents itself about the third or fourth day of the disease, commencing first in the *tunica adnata* of the eye, neck, belly, and breast. In some cases the yellow seems to pass into a light greenish tinge. Dysenteric symptoms not unfrequently accompany this form of remittent.

In other cases of this variety of remittent, the symptoms are at first mild, the vascular excitement not being considerable, nor the disturbance of the cerebral and digestive functions such as to create alarm, when suddenly great exhaustion of the powers of life, characterised by a weak, fluttering pulse, black, dry, and foul state of the tongue, offensive evacuations, a disagreeable fœtor of the perspiration, and extreme prostration of strength, retchings of dark, grumous

matters, sunk countenance, great anxiety, tenderness of the epigastrium, with fulness of the hypochondria, and a squalid or yellowish state of the surface, supervene, and indicate extreme danger in all cases, and approaching dissolution in many.

This unfavourable change and termination of that form of remittent, which, at its commencement, seemed to indicate the least degree of danger, generally take place in those whose constitutions have been most predisposed to disease, who have suffered from attacks of bowel complaints, are of the most relaxed and debilitated frames, and who, during the progress of the fever, are exposed to the continued action of those agents in which it originated, sometimes existing in a concentrated form, and accompanied with many of the accessory causes, as exposure to the influence of cold, damp, night-air, and other circumstances already enumerated.

Sometimes the remittent commences in the mild form now noticed, the patient being even able to walk about his apartment for several days, complaining chiefly of frequent irregular accessions of fever, when suddenly a violent and malignant state of febrile excitement supervenes, which suddenly exhausts the vital energy of the frame, and either quickly carries off the patient, or injures the structure and functions of the abdominal viscera, to an extent scarcely admitting of removal by the most judicious treatment.

In other instances, the symptoms of excitement are seldom manifest at any period of the disease, the febrile exacerbations consisting merely in an aggravation of the anxiety, restlessness, and general distress of the patient, with, in some cases, increased sickness, augmentation of pain at the epigastrium, head, and loins, &c., the pulse being but little accelerated until the close of the malady, and the temperature of the surface, unless at the epigastrium, being rather under the usual standard. In all such cases, however, the state of the tongue, and particularly the alvine evacuations, indicate danger: the former being either of a very dark colour and deeply coated, or soft, flabby, and lobulated; and the latter extremely offensive, generally of a blackish or greenish brown colour, of various consistency, and otherwise morbid. It would seem as if the causes of the disease had, in the above description of cases, nearly annihilated the irritability of the moving fibre, and deprived the system of its ability of reacting upon, or superseding, that state of the vital energy induced by their first impression.

Continued fevers are most frequently observed amongst the more recent visitors of warm countries, and constitute their seasoning to the climate. They occur also amongst older residenters and

the natives; but in these, remissions, although indistinct, may generally be detected. The continued fevers which attack new-comers to a warm climate always present more or less of an inflammatory character at their commencement; and a similar form obtains among all Europeans residing in it, although the celerity with which the inflammatory stage, or that of active excitement, exhausts itself, varies according to the nature of the causes, and the habit and constitution of the patients.

The most remarkable forms of continued fevers which have come under my observation in warm climates consist—*first*, of simple inflammatory fever; *secondly*, bilious inflammatory fever; and *thirdly*, of malignant continued fever. These distinctions, derived from the nature of the most prominent symptoms in each of the forms respectively, will characterise the more fully marked cases; but numerous instances will occur in practice, in which the above distinctions will not apply throughout the progress of the disease, and other cases will be met with where the practitioner will be at a loss to say in what particular variety they ought to be classed. He will very frequently find, that those fevers which are most inflammatory at their commencement become most malignant at their close; and he will often observe very prominent symptoms of bilious derangement conjoined with those of extreme exhaustion of the powers of life. But when the signs of malignancy are only the consequences of previous excitement, I do not conceive that the disease should be, on that account, characterised specifically by the term malignant, especially as the extreme exhaustion, from which the symptoms usually denominated malignant or adynamic proceed, does not take place when the previous excitement is moderated by a judicious mode of treatment.

The bilious inflammatory, as well as the simple inflammatory form of fever, very often terminates in the malignant or adynamic state; indeed it more frequently experiences this change than the foregoing variety, and often at an earlier stage of the malady; yet still, as in the other, the malignant or adynamic state is the consequence of the previous excitement, rather than the direct effect of the causes of the disease, although the causes may have, in many cases, a considerable influence in the early and marked appearance of this state. In both the inflammatory and the bilious inflammatory form of remittent and continued fevers, we must suppose the exciting causes as being insufficient to overpower the vital forces of the system, owing either to the inadequate concentration of these causes, to the slight predisposition of the patient, or to the unim-

paired energy of his frame. Hence, vitality being not materially affected, reaction upon the more immediate effects induced in the system by the causes of fever supervenes, and inflammatory excitement is the consequence, which, according to its degree, and to the extent to which these causes may have impaired the vital resistance of the frame, exhausts the irritability of the moving fibre, and induces the subsequent signs of collapse.

On the other hand, malignant continued fever, as well as the more malignant forms of remittent fever, betray symptoms of exhaustion, or the adynamic state, from the earliest appearance of disorder. This state follows immediately upon the impression of the exciting causes, which, owing either to the activity and combination of those causes, or to the high state of predisposition of the patient, overpowers the energy of the system, and prevents it from making any but inefficient efforts at reaction: these efforts, when made, generally take place at the usual period at which the exacerbations in remittents supervene, and thus the malignant continued fever frequently presents nearly similar phenomena to the malignant form of remittent fever.

In those instances where, from the activity of the causes, or the state of the individual, the powers of life are so far overwhelmed as scarcely to admit of reaction, the patient often seems to sink progressively from the period of attack; the most energetic means, employed with a view of rousing the energies of life, being often insufficient to induce excitement, and enable the secreting viscera to perform their functions. In those cases where the inefficient efforts at reaction are made at different intervals, the frame seems to be more and more exhausted after each effort, either until the system sinks exhausted in the struggle, or the functions of the secreting viscera become gradually re-established by the means employed, and the energies of the frame are thereby slowly restored.

The more inflammatory forms of continued fever, particularly as they are observed to occur in India amongst recruits and those who have not suffered from disease since their arrival in the country, prevail chiefly during the dry and warm seasons. That this type of fever, especially its more malignant and bilious forms, is in great measure dependent upon terrestrial exhalations for its origin, cannot I think, be denied; the form which the disease assumes resulting from the intensity and number of the exciting and occasional causes, in conjunction with the predisposition, temperament, and habit of the individual, and the various accessory circumstances to which he has been, or is at the time, subject. But continued fever, present-

ing inflammatory symptoms, nevertheless, frequently supervenes within the tropics, independently of the agency of malaria, in those who have been exposed to the sun, or intoxicated, especially after fatigue. Cold applied to the surface of the body, in whatever way, particularly after excessive exertion and imprudent exposure, will of itself produce an attack of fever, generally of the inflammatory or bilious inflammatory forms, according to the state of the individual at the time. But fever thus induced generally subsides under a judicious mode of cure, without evincing those dangerous symptoms which characterise fevers chiefly resulting from the active agency of terrestrial exhalations.

The most uniform stage of fever, if indeed it may be called a stage, is the period which more immediately precedes the breaking out of the febrile action, and it is of the utmost importance to arrest the disease at this period of its commencement. It admits of arrest at this stage in a great many cases, and when it cannot be cut short, it may generally be rendered more mild in its subsequent stages.

This period of disease although characterised by symptoms of a distinct and definite kind, is not confined to any particular form or type of fever: indeed, it is often indicative of the approach of acute inflammation of some internal organ; and it, in many cases, marks the approach of cholera and dysentery. But it more uniformly indicates the presence of continued and remittent fevers, and points out the period at which disease should be attacked, and by means of the measures then adopted, control over its subsequent stages acquired.

After this incipient stage of disease, the symptoms vary, in almost every case, according to the types and forms of fever now pointed out, and according to the complications to be noticed in the sequel. Even in six cases labouring under the same type and form of fever,—I may say, for the purpose of illustration, the bilious remittent,—we shall find one with suffused eyes, violent headach, and irritability of the stomach, with bilious vomiting, as the most marked symptoms;—a second with a bilious and dysenteric state of the alvine evacuations; foul, loaded, dark tongue; extreme pain of the loins and limbs; quick, irritable pulse; and fulness of the hypochondria;—a third with tumefaction of the abdomen; scanty, bilious, and acrid evacuations; vomiting of dark-green and bilious matters; a yellow tint of the conjunctiva, breast, and belly; and obscure remissions of the febrile actions;—in a fourth, a harsh, mordant heat at the epigastrium and abdomen; watery perspirations on the face, hands, and legs; and morbid, pitchy state of the stools;—a fifth with great tenderness and sense of heat and pulsation at

the epigastric region; quick respiration; oppression at the præcordia, constant irritability of the stomach and bowels; pain in the loins, eyes, and forehead;—and a sixth with pain at the right hypochondrium; great depression of spirits; quick, irritable pulse; partial perspirations; foul, dry, and chapped tongue; scanty, dark-coloured urine; and foul, bilious, and acrid evacuations.

The state of the pulse, tongue, and alvine evacuations, although indicative of serious disease, is different in each of these cases. In some the pain is most remarkable in the loins and limbs; in others, in the forehead or occiput; and in many, tenderness, anxiety, and distress, are felt, remarkably at the epigastric region, where the heat of skin is generally great. The appearance of the countenance and surface of the body also varies in each case; and the same remark often holds good in respect of the intellectual functions. In some instances the remissions are obscure; in others, the exacerbation of all the symptoms is very marked. Many cases commence with evident rigors and horripilations, whilst others experience these symptoms in so slight a degree as scarcely to attract attention. In one case the paroxysms increase in severity until exhaustion of the powers of life, terminating in fatal collapse, takes place; in another, the exacerbations gradually increase, until a critical or artificial evacuation reduces the violence of morbid action, and tends to restore the healthy functions of the organs; and in a third, the exacerbations become gradually diminished in severity until debility is the most marked symptom, and the functions of the vital organs are slowly restored, as the debility is removed by the treatment adopted.

In respect of the duration of the above types and forms of fever, little need be said. Intermittents and remittents are of extremely indefinite duration, the one being often converted into the other, according to the varying circumstances attendant upon particular cases. The more violent attacks of remittent and continued fevers may terminate in twenty-four hours, although usually extending from three to fourteen days; whilst the more mild forms may go on for a much longer period. But the duration of fevers in warm climates depends so much upon the various circumstances influencing the condition of the patient, that little can be said with precision on this point.

The *conversion* or transition of one type and form of fever into another is familiar to every observer of disease within the tropics. To explain its causes and the circumstances which dispose to it, is, however, a matter attended with difficulty. In many cases the

conversion of one form of fever into another seems to result from the change of season, and vicissitudes of weather and temperature: in some instances, the mode of treatment appears to have considerable influence in promoting this interchange of type, even although it may not altogether occasion it. But the chief cause is to be found in the prevalence of the exciting cause of fever, and its operation on the frame of the patient during the time he is subjected to treatment, and also during his convalescence. This seems to me a very material matter,—one of paramount import in the treatment of intertropical diseases, as influencing both their progress, terminations, and issue, and deserving more particular notice hereafter.

Intermittents often run into the remittent type, especially about the commencement of the hot season and of the monsoon; and this is particularly evident in cases which are characterised by considerable disorder of the stomach, bowels, and biliary organs. On the other hand, remittents not unfrequently are changed into intermittents, especially about the time of approaching convalescence from the former; and this is observed to occur particularly in those who have experienced marked disorder of the spleen or liver during the progress of the remittent type of fever, and who have been exposed to the influence of malaria whilst under treatment. Occurrences of this nature take place more frequently during the rainy and cold seasons than at any other. Not only are intermittents changed into remittents, but the latter are also converted into the continued type; and these changes may all supervene in the same individual, fever commencing in an intermittent form, and subsequently changing to the remittent, and lastly to the continued type. This series of changes seems to depend upon gradually increased disorder of the organs of digestion, especially the stomach, spleen, and liver, proceeding from the continued or even increased operation of those causes which originated the disease, and perhaps, in some cases, from the treatment adopted.

Continued fevers, especially those of the bilious inflammatory and more malignant forms, very frequently terminate in obstinate intermittents, which at first assume a quotidian, and subsequently a double tertian or quartan type. This is more particularly remarked in districts where the exhalations from the soil are abundant, and when the nights are chilly, foggy, and moist. Sometimes, also, continued fever passes into the remittent, and that into the intermittent form, under similar circumstances to the above. As in the former cases, this occurrence must chiefly be imputed to the influence of the external agents of fever upon the system during the

progress of the treatment, and to the method of cure adopted during the early stages of the disease. This transition of one form of fever into another, as in the instances of change already adduced, is often referrible to lesion of some of the abdominal viscera, more especially to obstructions and enlargements of the liver or spleen, or of both these organs.

Not only do the various types of fever change into one another, especially when the patients continue exposed to the exciting causes of intertropical fevers, and when some of the abdominal viscera are seriously deranged in the progress of the disease; but one type of fever may vary its character, or assume a different form in its progress, owing to the continued operation of the causes in which it originated. Thus, quotidians, tertians, and quartans, may change into one another, or assume an irregular or complicated form. A mild or bilious remittent, also, may become malignant, or complicated with visceral disease; and continued fever may commence with all the characters of strong arterial excitement, presenting a predominance of morbid action in the liver and stomach, or in the bowels, or even in the head or lungs, and suddenly assume a malignant or adynamic form. This sudden and great exhaustion of the energy of the system evidently depends upon more than one cause, and should be referred both to the collapse following morbidly excited vascular action, and to the continued operation of the exciting cause of disease on its victim during its progress.

That this sudden collapse of the powers of life is partly owing to the continued operation of the exciting causes of fever, is proved by the more favourable aspect which the disease assumes when the patient is conveyed beyond the sphere of action of those terrestrial exhalations which occasioned it, as when ships put to sea upon the appearance of fever amongst their crews, and after they have been exposed to the operation of its causes. Similar occurrences are also remarkable in various districts of intertropical countries, when the sick are removed from the reach of those causes which produced disease, or at least to situations where they exist in a less concentrated and dangerous form.

Sect. III.—*On the Complications and Terminations of the Fevers of Warm Climates with the Appearances on the Examination of fatal Cases.*

The fevers of warm climates, especially as observed in the eastern hemisphere, seldom go through their entire course without evincing a predominance of morbid action in some viscus or texture, most

frequently in those seated in the abdominal cavity and in the cranium. In many cases, this increased disease is evinced in more than one organ, and is often extended to viscera situated far apart, and not intimately allied to one another either in function or by vascular connexion. I do not, however, consider that the increased disease in certain localities ought to be viewed as the immediate cause of the febrile excitement, or, in other words, that fever is merely general disorder supervening to disease of a particular organ; but, on the contrary, that the exciting causes of fever produce disorder of the frame generally, which, owing to the predisposed state of certain viscera or textures, occasions a prominent derangement of them; and that if this superinduced disorder be allowed to proceed, it often aggravates the general fever, and rapidly terminates in organic lesion.

In the treatment of the majority of fevers in warm climates the chief danger is to be apprehended from the supervention of local mischief; and when complications thus arise, our principal means must be directed to the preservation from organic lesion of the prominently disordered viscera. Hence the importance of detecting such complications at their commencement, and of employing suitable remedies for their removal as early as possible after their supervention.

Amongst the most early local affections which appear in the course of intertropical fevers, is an inflammatory state of the mucous surface of the stomach and duodenum. This is indicated by the nausea and irritability of the stomach; by the sense of fulness, heat, and tenderness at the epigastric region; and the foul, loaded tongue, with red sides and apex. In the progress of those fevers in which these are prominent symptoms, especially in the bilious remittent and bilious inflammatory continued fevers, and in many of those which assume characters of a malignant kind, the inflammatory state of this part of the digestive mucous surface exists in a more or less aggravated form, and not unfrequently extends to the internal surface of the small intestines, and even, in some cases, to the large bowels.

This extension of the inflammatory action to the small intestines is indicated by tumefaction and tenderness of the abdomen to pressure made about the umbilicus, by a sense of inward soreness or heat in this situation, and by an irregular state of the functions of the bowels, attended with occasional sickness, and a frequent, scanty state of the alvine discharges, approaching to diarrhœa, and sometimes to an intermediate state between diarrhœa and dysentery. If

the affection of the mucous surface extends to the large bowels, then the dysenteric symptoms become more fully marked, the stools have a still more morbid appearance, but the evacuations are not always tinged with blood. In these cases, upon an attentive examination of the patient's abdomen, tenderness and soreness are often complained of in the course of the colon, and frequently in the cæcum. The affection of the mucous surface of the stomach and small intestines often supervenes in the earlier periods of fevers, that of the large bowels occasioning dysenteric symptoms in the more advanced stages; and thus it not unfrequently happens that fevers, especially those occurring in unhealthy situations, and where the patients are exposed to the chilling cold and dews of the night, or even to the raw night-air merely, run into dysentery of a very dangerous form.

The supervention of the complications now adduced in the progress of many fevers in warm climates, generally is owing to the irruption of an acrid or irritating bile into the duodenum and stomach, and to the excitement which this fluid occasions as it passes along the alimentary canal. Much also is owing to the accumulation of morbid secretions in the small and large intestines. These secretions seem to undergo some change, rendering them more irritating to the surface which they cover; and this change is evidently the greater, as the effects thereby produced are so much the more marked, the longer they have been retained in the *prima via*, owing to a costive or neglected state of the alvine functions.

The accumulation of fæcal matters in the large bowels during fever is so obviously productive of disease in these viscera, that I am suprised more attention has not been drawn to the circumstance by modern writers. During fevers, all the secretions, particularly those which are retained in the body for any time after their production, undergo very great changes, and are rendered more irritating or otherwise injurious to the surfaces with which they come in contact. Hence those secretions which are excrementitious, and which, from their hurtful tendency when retained, require to be removed from the system, being allowed to remain and accumulate in the large bowels, irritate the internal surface of these viscera, and this irritation, either from its long duration or repetition, excites inflammatory action, which becomes the prominent state of disease, and thus idiopathic fever is converted into dysentery, either of an acute, sub-acute, or chronic kind, according to the activity of the inflammatory action, and condition of the patient. If the liver has been affected during the progress of the fever, as is frequently the case,

the morbid secretion proceeding from this organ still further assists in the production of the dysenteric affection, and perpetuates it when produced, rendering this affection in every respect indentical with that complication of dysentery which has been already described, under the head of Hepatic Dysentery.

The next frequent complications, if not the most frequent, which supervene in the course of fevers, are affections and lesions of the liver. There will seldom be observed, in warm climates, especially in the eastern hemisphere, a single case of fever, of whatever type, in which the functions of the liver are not more or less deranged. This derangement presents, in different subjects, and even in the same subject at different stages of the disease, every variety of form. In many, the biliary secretion is morbidly increased; in a few, it is diminished; in others it seems to accumulate in the hepatic ducts or in the gall-bladder, or in both, and afterwards to be let loose, occasioning marked disorder in the stomach and intestinal canal; and in almost every case, whether it be secreted in excess or in diminished quantity, it is evidently of a morbid quality, as respects its effects upon the alimentary tube, or its appearance in the evacuations.

This morbid state of function exists more or less in all the forms and types of fevers, and in many from their earliest stages, although it becomes more manifest in their progress, when the structure of the liver is often also deranged. Disease of the liver, as respects both its functions and organisation, thus becomes a very frequent complication in intertropical fevers, in some in their early stages, in others not until their advanced periods. In some types and forms of fever, the complication is general; in others, it is only occasional, although of frequent occurrence.

Functional derangements of the liver are common in all cases of fever, in some one of their stages, and in many from their earliest periods. This is particularly observed in respect of those forms of fever which, from the prominent nature of the complication, have been denominated bilious, and which, owing to the concentration of the exciting cause and the predisposition of the patient, assume either an intermittent, remittent, or continued type. In these forms of fever, organic lesion of the liver often follows closely upon the functional disorder, if indeed the disordered function be not the consequence of organic change in its earlier stages. In the other forms of fevers, the functional disorder of the biliary apparatus is often not so soon evident, or it does not become a prominent feature so early in the disease; yet it may nevertheless exist to some extent, and may even be associated with, or proceed from, organic change

of the structure of the organ in its early progress: for disease of the liver is often detected after death in cases of idiopathic fever, where it was not suspected to exist during the life of the patient.

When the liver becomes organically changed in the course of fevers, the external or serous surfaces, which are the most sensible parts, are seldom much affected; and when the lesions of structure are not accompanied with great enlargement of the viscus, or a remarkable state of deranged secretion, their existence during the progress of the fever is not easily detected. The difficulty of ascertaining the presence of many of the organic changes to which the liver is liable, is confessedly great, when these changes supervene primarily; but the difficulty is much increased when they arise in the progress of intertropical fevers.

The observations already offered on the subject of hepatic diseases, will, I trust, be found of some aid in detecting this very important form of complication, and in ascertaining its precise nature. In addition to what has been stated, I may mention, that a sallow-muddied appearance of the countenance; a harsh and dusky state of the surface, with a yellowish tinge; fulness, tenderness, or soreness of the right hypochondrium and epigastric region, with pain in the right shoulder or shoulder-blade; bilious vomitings; a morbid and bilious state of the alvine evacuations; pains in the orbits, forehead, loins, and limbs, &c. &c., should warn the physician that the structure as well as the functions of the liver may be in a state of lesion.

In the more protracted cases of intermittent fever, especially those of the double tertian or quartan type, the liver frequently becomes enlarged in size, and its substance congested, with obstructed circulation through its blood-vessels and biliary ducts. This derangement is often accompanied also with enlargement of the spleen, and a tuberculated state of the pancreas. In some cases of intermittents, especially such as are accompanied with symptoms of the adynamic state of system, the liver is not only congested, but softened in its structure; but this lesion can only be inferred during the life of the patient.

In the remittent forms of fever, both functional and organic disease of the liver is very generally present. Congestions, enlargement, and inflammation, not unfrequently supervene, especially in the bilious and bilious inflammatory forms of this type. Occasionally, purulent collections also form in the substance of the viscus; but they are seldom evinced by sufficiently precise or uniform symptoms beyond those already enumerated, by which the practitioner

may be enabled to guide his prognosis and treatment. The symptoms of diseased structure only of the organ are furnished; the precise nature of the organic change can seldom be disclosed to him until inspection after death furnishes the information. When purulent collections form in the liver during the progress of remittents, rigors, or horripilations are not uniformly present; and when they occur, they are often mistaken for the commencement of the febrile exacerbation. The signs adduced above, followed by night-sweats, diarrhœa, and a morbid state of the alvine evacuations, tumefaction of the right hypochondrium and epigastrium, &c., are amongst the most prominent symptoms which are usually remarked.

The continued forms of fever are also often complicated with disease of the liver. In the inflammatory and bilious inflammatory form of this type, the substance of the liver very frequently suffers from active vascular excitement; and this excitement often passes into a state of inflammation, of a more or less active kind, which, in its progress, produces the various organic changes to which the parenchymatous structure of the organ is liable. Thus enlargements, softening, induration, obstructions, tubercular formations, and abscesses, form in its substance, according to the activity of the vascular action, the habit and temperament of the patient, and the state of function of the organ at the time when fever commenced. But these kinds of organic change are not limited to the continued forms of fever; they also supervene in the course of fevers of the remittent types.

In the malignant or adynamic forms of fever, whether presenting the continued or the remittent types, softening of the liver often takes place; and although it can seldom be recognised with precision during the course of the disease, unless it be associated, as it very often is, with congestion, enlargement of the viscus, and a morbid state of the biliary secretion, it is one of the most dangerous lesions to which the organ is liable. I have often found it upon dissection of those cases which presented much tenderness and tumefaction of the hypochondrium and epigastric region; great anxiety; urgent thirst; sense of burning, with great heat at the epigastrium; dark-coloured and loaded state of the tongue; weak and quick pulse; and a morbid, offensive state of the alvine evacuations, with vomiting of dark grumous matters. Whether this softening results from the excessive vascular action to which the liver has been subject, or proceeds from the noxious influence of the cause of fever upon the vitality and tone of the frame generally,

and of the liver in particular, or to both these causes, I shall not take upon myself to decide. It is probable, however, that both circumstances have a considerable share in the production of this species of organic change, as well as several others of a similar nature.

The spleen very often becomes diseased during the course of fevers, especially in protracted cases of agues, or when remittents and the continued type of fever run into the intermittent form. Enlargements of this viscus, of an indolent or passive kind, and occasionally enlargements associated with pain and tenderness in the region of the spleen, are very frequent in all cases of protracted fever occuring in low, marshy, or thickly wooded situations. Sometimes the enlargement is accompanied with signs of considerable inflammatory action in the surfaces of this viscus, as indicated by acute pain and tenderness to the touch; but in the majority of cases, the enlargement, although present to a great extent, is attended with little uneasiness, or even soreness upon pressure. In some cases, the affection of the spleen does not make its appearance until convalescence from the fever has commenced. This is most frequently remarked in the remittent and continued types of fever; and when observed to supervene in them, either at this time or in their far advanced stages, there is generally much risk of the disease being about to assume the intermittent type.

The complication of affections of the spleen with fevers is most prevalent in the old European residenters in the climate. It is also not unfrequent amongst natives, particularly among those who have migrated from the higher and more northerly provinces of India to the low, swampy, and wooded districts on the mouths and banks of rivers, and on the sea-coast, especially during the rainy and cold seasons. The complication also of structural disease of the liver with fever is most common among those who have passed some time within the tropics, and who are addicted to the abuse of spirituous liquors; while among more recent visitors of a warm climate, functional disorders, and acute inflammations of the viscus are not unfrequently observed to take place in the course of the continued and remittent types of fever, especially those which assume an inflammatory or a bilious form.

Although diseases of the pancreas occasionally are observed upon the *post mortem* examination of fatal cases of fever, and most probably supervene in the progress of the disease, yet we have no means upon which we can depend of detecting their existence during life. They may, however, be inferred to be present from the

supervention of a watery diarrhœa with a ropy, light-coloured fluid in the stools; from pain in the epigastric region and across the back, particularly between the loins and shoulder-blades, with sickness at stomach. In some fatal cases of fever, in which I have found, upon examination, enlargement of the pancreas, with irregular steatomatous tumours in its structure, there was also present during life a yellow tinge of the surface of the body conjoined with the above symptoms, the common biliary duct being obstructed, from the pressure of the tumours of the pancreas; the gall-bladder filled with a thick, viscid, and dark-coloured bile; and the liver of a deep colour, and congested both in respect of its blood-vessels and bile-ducts.

Determination of blood to the head, producing inflammation of the substance or coverings of the brain, with delirium, coma, &c. very frequently supervenes in the course of the inflammatory forms of the continued and remittent types of fever. It is generally remarked to take place in those who have exposed themselves to the rays of the sun, especially when in a state of intoxication, and amongst soldiers subjected to great exertion and fatigue during high states of atmospherical temperature, or under a burning sun. In many of such cases it is extremely difficult to decide whether the disease is purely phrenitis, or idiopathic fever; but in most instances the cerebral symptoms are distinctly posterior to the full development of the febrile disease, and hence are to be considered as resulting from the general febrile excitement, owing to the predisposed state of the organ, induced by the circumstances now alluded to, the exciting causes of the fever being anterior to those accessory causes occasioning the marked determination of the circulating fluid to the head.

The affection of the brain and its membranes is common in the course of fevers occurring amongst recruits and recent visitors to warm climates. It is very frequently observed amongst this class of Europeans at Madras, where the atmospheric temperature is extremely high; and the febrile attacks, during which this symptom is so well marked, are there more to be imputed to exposure to the sun and to the high range of temperature, especially amongst the class of persons now alluded to, than to any exhalation which may proceed from the soil. Fevers in which the cerebral symptoms become prominently marked in their course, are generally most numerous during the hot season, and frequently occur in the parched districts in the southern provinces of the Indian peninsula. In many cases of fever thus complicated, whether of the continued or

of the remittent type, the more marked symptoms of cerebral excitement and increased vascular action in the brain are superseded by stupor, coma, low delirium, and many of the typhoid or adynamic symptoms which characterise the worst forms of typhus in a temperate climate; but without any signs of the disease being possessed of infectious properties.

Symptoms indicating great lesion of the functions of the brain frequently appear also in the course of the more malignant forms of continued and remittent fevers. These are sometimes characterised by excitement, but in the earliest stages of the disease only; the increased action being soon followed by exhaustion, either owing to the previous morbid excitement, or to the continued influence of the exciting cause of the disease upon the nervous energy of the frame. In other cases, the excitement is never fully developed, a great want of the energies of the mind being evident throughout, with stupor and indifference to all external objects and to the issue of the disease, sometimes with a strong indisposition on the part of the patient to the use of the requisite remedies. In cases of this description, the exciting causes of the disease have destroyed the vital energy of the frame, so far as to render it incapable of any effort at reaction, and the functions of the brain and nervous system either sink gradually with the other corporeal functions, or at last rally so far, after repeated efforts, assisted by the powers of art, as to bring about a return to healthy action.

In some of the warm countries which are situate near to, or without, the tropics, or in those which have great elevation above the level of the sea, as the more northerly provinces of India, and many places in the western hemisphere, pulmonary affections not unfrequently supervene to, or accompany, the prevailing form of fever, especially during the cold and rainy seasons. The pulmonary disease in some individuals is so great as to amount to inflammation of the lungs, and to occasion all the consequences which usually follow this malady. In other cases it consists chiefly of bronchitis, and in many of simple catarrh. In the more southerly provinces of India this form of complication is seldom met with in fever.

Rheumatism sometimes appears in the course of fevers, especially during the progress of the intermittent and remittent types. This complication is most frequent in the highly elevated districts and northern provinces of Hindostan, and is generally the consequence of exposure to partial currents of cold or damp air during perspiration, and is frequently dependent upon accumulations of morbid bile in the biliary apparatus and alimentary canal, or other derange-

ments of the biliary and digestive organs. This complication is very frequent amongst the natives of the climate and the old European residenters. In the former the rheumatic attack very frequently supervenes to the decline of the fever, or during convalescence from it.

Erysipelas not unfrequently makes its appearance in those who are subject to it, or it supervenes to some scratch or sore, during the course of remittents or intermittents of an adynamic or malignant form. This occurrence is most frequently observed to take place in the more marshy and unwholesome situations near the mouths and banks of rivers, and in thickly wooded districts, where the exhalations are most noxious. It is also favoured by the rainy and cold seasons, when these exhalations generally are most concentrated and deleterious. Under similar circumstances to these, not only do sores, scratches, or wounds, readily assume an erysipelatous character, but this latter betrays a strong disposition, particularly in hospitals, to run into a gangrenous form. This complication, and the consequences to which it is liable, under the above circumstances, have been very frequently presented to my observation in various districts in India, and particularly during the expedition to Batavia in 1811.

Amongst the natives, ulcers and sores on the lower extremities are very frequent; and, during the progress of intermittents and remittents, frequently assume a foul and obstinate character. Both erysipelas and external sores are aggravated by marsh exhalations, and are not unfrequently complicated with the periodical forms of fever. The continued type of fever is seldom or ever observed in those who are affected with these local ailments. It would seem as if the state of constitution accompanying them, or upon which they depend, were incapable of experiencing fever in its continued type, although readily assuming the periodical form.

In those low districts of country within the tropics where marshy exhalations are most abundant and concentrated, especially during the rainy and cold seasons, almost all diseases assume an intermittent or remittent form, in a more or less marked degree; and the characters even of the most inflammatory are often changed to the low or adynamic state, requiring a very different method of cure from that which is found most beneficial during the dry and hot season, or in dry and elevated situations placed beyond the sphere of action of the marsh exhalations.

Having now pointed out the most usual complications and forms which fevers assume in warm climates, particularly in the eastern

hemisphere, I shall offer some remarks on the various lesions which I have observed upon the examination of fatal cases of fever occurring in warm countries.

Organic Changes observed in the Examination of fatal Cases of Intertropical Fevers.—In the bilious and malignant forms of fever, the surface of the body frequently presents a discoloured appearance. It is generally of a yellowish tint, or of a yellowish green. Sometimes an ichorous fluid escapes from the mouth and nostrils. In the other forms of fever the external surface is not often remarkably altered in apppearance.

Upon opening the head, the membranes of the brain are frequently observed more vascular than usual. Sometimes the arachnoid is opaque, and a clear or slightly yellowish serum is found between the membranes and in the ventricles of the brain. The substance of the brain, when divided, often betrays increased vascularity, by the number of bloody points observed in the divided surface; in some cases it is softer than natural, and in others it is firmer. In the inflammatory forms of fever, and where the cerebral determination is great, the above appearances are more strongly marked. In the adynamic or malignant forms, the most uniform and prominent lesions of this part of the body are great congestion or engorgement of the veins and sinuses of the head, and sometimes effusion of serum between the membranes or within the ventricles of the brain.

The thoracic viscera seldom betray marked signs of disease, unless in those forms of fever in which pulmonary affections had supervened in its progress, or which were accompanied with this local derangement. In such cases, portions of the lungs have been hepatised, and the bronchia loaded with mucus or muco-purulent matter, and the mucous-membrane of the air-passages inflamed in patches. The heart generally presents few marks of disease. The right cavities are often greatly loaded with blood, and the pericardium sometimes contains a little serum. In the more malignant and adynamic forms of fever, the substance of the heart frequently seems much softer than natural. In cases of this description, the blood in the right auricle is often semifluid and of a very dark colour: and the pericardium often contains a considerable quantity of a turbid serum or of a sanguineous fluid. Effusions of serum are sometimes observed in the cavities of the chest, especially in those who have died of the remittent or intermittent types of fever.

In some of the more protracted cases of ague, especially when complicated with organic disease of the liver or spleen, dropsical

effusions are common; and in such cases the effusion into the cavities of the thorax is often very considerable. When the patient dies of the cold stage of ague, which rarely happens, the lungs are usually greatly congested with dark-coloured blood, as well as the auricles of the heart, especially that of the right side: the veins and sinuses of the brain are also engorged with black blood. In all cases of this description, the circulating fluid seems not to have undergone its usual changes in the lungs to the full extent, for a short time before death, as even the blood which is found in the arterial trunks is of a darker colour than natural.

The stomach is frequently found distended with flatus, and its internal surface and tunics, especially in the situation of the spleen, are often inflamed, congested, in a few cases ulcerated, and occasionally of a purple hue. In short, this viscus presents nearly the same appearances, especially as respects its mucous surface, as has been already described when treating of the inflammatory diseases to which it is subject. Lesions of the stomach, particularly in its internal surface, are most frequently met with in the bilious and malignant forms of fever, or in those cases of the inflammatory kind which have run into the adynamic or malignant form.

The lesions of the spleen are chiefly observed in fatal cases of protracted ague and remittent fever, or when fever of the continued type runs into these forms, and ultimately proves fatal. In the more malignant kinds of fever, the spleen is often observed enlarged and uncommonly softened, so as to resemble a semifluid or gelatinous mass. In some of the more inflammatory kinds of fever, the surface of the spleen has been found inflamed and thickened, and even adherent to the stomach or to the abdominal parietes. In fatal cases of ague it is generally much enlarged; sometimes softer, at other times harder, than natural; occasionally tuberculated; and not unfrequently it contains hydatid-like bodies. In some cases of ague and fever, terminating fatally in the cold stage, the spleen has been found uncommonly engorged with blood; and in a few cases I have found it ruptured, and an immense quantity of blood effused in the abdominal cavity.

The liver is seldom found without some mark of disease. The surfaces of the organ are much less frequently affected than its parenchymatous texture. In agues and remittents, enlargements of the viscus, with tubercular formations in it, are not unfrequent. Congestion of the organ, as respects both its blood-vessels and biliary ducts, is very frequently remarked; and in the more inflammatory and bilious forms of fever, not only are these sets of vessels

congested, but signs also of greatly increased arterial action are present, sometimes extending to some part of the surface of the viscus, and producing adhesions between it and an adjoining organ or surface. Occasionally, purulent collections, or even large abscesses, accompanying the foregoing lesions; and, in a few instances, these latter have opened in some one of the situations enumerated when treating of abscess of the liver.

In the more malignant forms of fever, and in many of the cases of the inflammatory and bilious kinds which terminate with adynamic and malignant symptoms, the liver is found of various shades of colour, from a pink to a purple or blackish hue, much softer in its texture, and varying in bulk, being in some few cases rather smaller than natural, but in the majority of instances greatly enlarged, as well as softened in its texture. In fatal cases of these varieties of fever, a deeper shade of colour, with considerable venous congestion and enlargement, generally is associated with softening of the internal structure of the viscus.

Morbid appearances of the liver are observed most frequently in fatal cases of the inflammatory and bilious inflammatory forms of fever: they are also very often found in agues, and in those cases, of whatever type, which degenerate into the malignant form. Lesions of the liver, in fevers, are often associated with disease of the stomach, bowels, and spleen, especially about that part of the stomach adjoining the spleen.

Marks of disease of the small and large intestines are generally confined to their internal tunics. The duodenum, jejunum, and ileum, especially the duodenum and termination of the ileum, very frequently are diseased in their mucous surface, which is inflamed in patches, sometimes covered with a muco-purulent secretion, and studded with small ulcerations, particularly the termination of the ileum. Occasionally, the mucous surface is of a brick-red or purplish shade of colour, apparently ecchymosed, and covered with a bloody sanies, and readily detached from the subjacent texture. In several cases, the ulcerations, which sometimes are large and far apart, at other times small and agglomerated, especially the former, have nearly penetrated the tunics of the intestines, and, in a very few cases, I have observed this occurrence actually to have supervened, the contents of the bowels being partly effused into the peritoneal cavity, and having produced peritonitis.

Amongst the most frequent organic changes observed in examinations of fatal cases of intertropical fevers, are derangements of the internal surface of the large bowels. These derangements are

uniformly remarked in those cases of fever which are attended with dysenteric symptoms in their course, and consist sometimes of ulceration, but more generally in a softened and pulpy state of the mucous lining, which is often of a dark and mottled colour with contraction of the calibre of the bowel.

Marks of inflammatory action are occasionally met with in the peritoneum, omentum, and mesentery, in all the forms of fever; and in protracted cases of the remittent and intermittent types, especially those in which the liver and spleen have been obstructed or otherwise diseased, considerable effusions of a serous fluid into the cavity of the abdomen are not uncommon. In these cases, the peritoneum presents either a sodden appearance, or congestion of the veins. In many of those cases, also, the mesenteric glands are enlarged, of a light colour, and hard consistence. Diseased appearances of the mesenteric glands are not associated alone with the dropsical effusions, as they are frequently observed when no such effusion is present, and when the mucous surface of the bowels is diseased, and the liver and spleen enlarged, and otherwise changed in structure.

Such are the most frequent lesions which have occurred in my researches into the pathology of intertropical fevers. Others not enumerated nor referred to may be occasionally remarked; but I am not aware of having omitted any of importance as being calculated to throw light on the nature of this class of diseases.

SECT. IV.—*On the Prognostic Symptoms of Intertropical Fevers.*

The occurrence of convulsion during the paroxysms of ague should always be considered as an unfavourable symptom, especially when conjoined with anticipation of the period at which the paroxysm usually comes on. Tertians are most frequently liable to present anticipations of the paroxysms, and complications with convulsion. Quartans are generally the most protracted form of this type of fever, and most surely lead to the production of organic disease. Retardation of the period at which the paroxysm usually supervenes is to be considered in a favourable point of view, and sometimes indicates a disposition to crisis.

Complicated and irregular forms of ague generally indicate a more serious and intractable disease, and danger of visceral complication, if, indeed, such complication does not actually exist and occasion the irregularity which the disease has assumed. When,

also, the paroxysms of intermittents terminate without sweats or other evacuations, as purging, vomiting, &c., the existence of serious visceral disease, generally amounting to organic lesion, more especially if the paroxysms be followed by indistinct or imperfect intermissions, should be anticipated. If the intermissions are complete, and the absence of fever perfect, immunity from visceral lesion, and a favourable issue, may be expected.

The state of the *countenance* affords the observing practitioner many of his chief indications of the probable issue of febrile diseases. When the expression of the face is serene, confident, clear, and animated, the disease may be considered as of a mild character, at least void of malignancy or sinking of the powers of life. When this state of countenance is observed to take place in the advanced stages of fever, it may be considered as the indication of a favourable crisis. If the face is large, injected, of a deep crimson or dark colour, with prominence of the eyes, and distress or an expression of anxiety, in the first stages of fever, the increased excitement and determination to the head occasioning this appearance may be viewed as speedily leading to exhaustion of the powers of life; and if these signs supervene in the advanced stages of the disease, a fatal collapse or approaching malignancy may be dreaded. Whenever the countenance expresses anxiety and distress, especially when it is also tinged of a yellowish hue, with constriction of the features, and want of serenity and confidence in the expression, extreme danger may be apprehended. A full, bloated, waxy, or livid state of countenance, especially if it assume a tawny or mahogany tinge, indicates very dangerous congestion, and often approaching death. A similar remark applies to a withered-like or collapsed state of the features, with an appearance of agitation and distress.

The condition of the *external surface* of the body also affords an important source of information to the practitioner, as to the probable issue of the disease. If the skin be soft and perfect in its sensibility, its heat not excessive, although augmented, but without an unpleasant feeling of burning, and if the increased temperature be equally diffused to the extremities, a favourable result may be looked for. When, on the contrary, the skin is dry and harsh, as if thickened, with an ardent, caustic, or unnatural heat; if it be dark, livid, or otherwise tinged or changed from its natural hue; if it be little sensible, not readily raised into vesications by the application of blisters, or if the vesicated surface assume a black or dark hue; if the heat be ardent in the head and trunk, particularly at the epigas-

trium, and diminished in the extremities; if the skin be thickened, apparently withered, dusky, flaccid, or yellowish; if it be torpid, tawny, streaked of varying shades; if it be damp, greasy, puffy, or bloated,—the danger should be considered great.

When the *perspirations* are warm, fluid, general, and copious, accompanied with an open or free pulse, a favourable issue may be expected. On the other hand, if the perspiration be cold clammy, scanty, or partial, with a nauseous or disagreeable odour, especially if the pulse at the same time be weak, small, frequent, and oppressed, —danger is to be anticipated.

The supervention of erythematic or erysipelatous inflammation in the seat of sores or abrasions of the cuticle, the breaking out of old ulcers, or a foul, gangrenous appearance of such sores as previously existed, denote failing energy of the powers of life, and a tendency to dissolution in the textures.

The *pulse* is among the most important sources of information in fevers. If it be under one hundred or one hundred and ten, at the same time free, energetic, and regular, the fever may be considered as mild and tractable. On the contrary, if the pulse rise above this number; if it become also irregular, tumultuous, or oppressed, especially in the latter stages of disease, then considerable danger is to be apprehended. Great frequency, with intermissions, smallness, weakness, irregularity, starting, &c. also denote extreme danger. If the pulse, from being frequent, becomes less so, and more free, expanded and soft, a favourable change may be hoped for; and if it also intermit every fifth or sixth stroke, the supervention of crisis may be expected.

On the accession of the paroxysms of fever, the *respiration* is generally frequent and irregular, and then this state of function is attended with no unfavourable indication. But when an irregular and frequent state of respiration is observed in the course, or during the advanced progress of fevers, considerable danger is evinced, especially if this state is accompanied with a sense of constriction or oppression, or when the breathing is particularly short, hurried, difficult, and laborious. A still, quiet state of respiration, the motion of the thorax being scarcely perceptible, also indicates danger, especially when accompanied with symptoms of stupor or torpor, and other signs of malignant or adynamic disease. A slower state of respiration than natural, occasionally interrupted with deep sighs, or convulsive heavings of the chest, is also a very unfavourable symptom, especially in the lower forms of continued and remittent fevers. A cold raw state of the patient's breath, especially if

accompanied with an offensive, fishy odour, indicates a malignant state of disease, and approaching dissolution.

The appearance of the *tongue* and *mouth* is one of the best guides which is furnished us in ascertaining the states of the internal viscera, particularly those lodged in the abdomen, during the progress of fever. In the course of the mild or less dangerous forms of fever, the tongue is generally foul, coated with a yellowish or cream-coloured mucus; sometimes a little red at the sides and apex, and rather dry, or moderately moist in the centre. In proportion as it departs from this state, the severity or danger of the disease may be anticipated.

If the tongue be covered with a milky, mealy, and whitish coating, and if it be at the same time large, flabby, or swollen, an adynamic or malignant state of disease may be expected. If it be rough, dark-coloured, with prominent papillæ, and not particularly coated, but red, or brick-red, especially towards the sides, inflammation may be dreaded in the alimentary canal, or in the structure of the liver, especially if at the same time the patient complains of tenderness, or a sense of burning at the epigastric region; and if, in addition to these signs, there be a sensation of caustic heat at the region of the stomach, with anxiety, diminished temperature of the extremities, and laborious respiration, the internal visceral disease may be considered as being far advanced, and collapse of the powers of life near at hand.

When the tongue is white or coated, with the papillæ erect or excited, and the edges red and fiery, we may consider that great vascular excitement is going forward in some internal organ, or in some parenchymatous structure, although no other symptom, not even the state of the pulse, should indicate it, and that vascular depletions are required. When the tongue is covered with a deep-yellow coating, congestions of bile in the liver and gall-bladder are evinced; and if this appearance pass rapidly into an excited, dry, and brownish state, the supervention of inflammatory action in the substance of the viscus, with increase of the febrile action, and diminished nervous energy, is thereby indicated. A dark or brick-coloured redness of the tongue, with a glossy surface, partially covered with a half-detached coating, and a dark, scanty, and tenacious mucus in the mouth, show considerable danger, and a tendency to symptoms of a malignant or adynamic kind.

A leaden, sodden, parboiled, flaccid, smooth, enlarged, tremulous or diminished size of the tongue, are all unfavourable symptoms in fever. If it become, in the progress of disease, thickly covered with a black, fuliginous coating, or exhibit, in addition, deep fis-

sures or rents, the apex and sides being of a brownish or dark colour, an adynamic state of system may be considered as fully formed, and the mucous surface of the alimentary canal as being in a state readily convertible into sphacelation. The disease should be viewed as being in a still more malignant state, and dissolution approaching, if the gums readily bleed when touched, if they and the teeth are covered with a black, viscid mucus, if the former discharge an ichorous or bloody sanies, or if an ichorous fluid escape from the nostrils or posterior fauces. An inky state of the surface of the tongue sometimes ushers in the foregoing symptoms, and indicates the commencement of the malignant form of disease.

Thirst is always great in intertropical fevers; sometimes it is insatiable. This symptom is not of itself indicative of great danger. The absence of thirst, especially when the tongue and fauces are dry, rough, and parched, is always an unfavourable sign. A constant desire for drink, yet the patient drinking little when it is furnished to him, is also an unfavourable symptom.

Nausea and *vomiting* accompany nearly all intertropical fevers. In some cases, nausea, especially when long continued, is a more unfavourable sign than full and free vomiting. The discharge of large quantities of yellow bile is very frequent, especially in the bilious and inflammatory forms of fever; but, although indicating great violence of disease, it does not portend of itself an unfavourable termination. When, however, the discharge from the stomach is very ropy, flaky, and viscid, when its colour is various, as green, yellow, and dark green, a dangerous form of fever may be dreaded; and the supervention of black, or coffee-ground, or dark grumous vomitings is to be feared. In some cases of the worst forms of fevers, especially during their advanced stages, the quantity of matters thrown off the stomach is extremely great, and far exceeding the bulk of the fluids received into the organ.

Singultus often accompanies the irritable and diseased state of stomach characterising certain forms of intertropical fevers. It always indicates a severe and dangerous disease, with considerable local determination either to the stomach or liver, or to both. When it supervenes late in the disease, and has been preceded by pains, burning sensation, and a feeling of caustic heat in the epigastrium, or distension, oppression, and tumefaction in the hypochondriac regions, &c. it is to be viewed as indicating the approach of death, especially if it be obscure or suppressed, and accompanied with a sense of tension at the præcordia.

The *state of the abdomen*, upon examination, furnishes many

useful indications as to the nature and complications of febrile diseases, and the probable issue of their different forms. Upon an attentive examination of this part of the trunk we have mainly to depend, as to the probable condition of the stomach, liver, spleen, and bowels,—the viscera which generally suffer the most severely, first in their functions and subsequently in their structure, during the progress of the various types and forms of fevers incidental to warm climates.

Great sense of tension, oppression, or pain in the hypochondriac regions, indicates local determination to the liver, or spasmodic stricture on the biliary ducts, and a proportionate increase of danger, which may be considered as being heightened, if tenderness on pressure, a harsh, caustic sense of heat or of burning, with a dry parched skin, great thirst, dark coated tongue, and sickness, be present in addition to those. Similar sensations and symptoms perceived in the epigastric region, particularly if accompanied with tumefaction in this situation or in the hypochondria, also indicate very considerable danger, especially when observed in the adynamic or malignant kinds of fever, or in the advanced stages of the inflammatory or bilious forms.

A tympanitic state of the abdomen, particularly when attended with a feeling of tension, intolerance of pressure, sense of burning, great increase of heat, a harsh, dry, and dusky appearance of the skin, and watery, foul state of the alvine discharges, with a brown or dark-coloured tongue, is to be considered amongst the most dangerous symptoms which come before us.

Fulness, tension, and soreness in the abdomen, especially about the umbilicus, with morbid mucous stools, and an irregular and irritable state of the bowels, indicate an inflammatory condition of the small intestines, generally effecting the internal tunics, and increased danger. If these symptoms be accompanied with a harsh dryness and increased heat of skin over the abdomen, and with vomiting, and if they supervene in the progress of fever, when the vital resistance of the frame is diminished, the danger may be considered as being imminent. Similar symptoms experienced at the epigastric region and in the course of the colon, with a dysenteric state of the alvine discharges, scanty urine, and mental despondency, are also to be viewed as evincing great danger.

With respect to the *evacuations from the bowels*, much may be said. They furnish many of the most important signs by which the practitioner can be guided, either as to his prognosis or to his practice. They should be carefully examined on all occasions. In

the mild and less dangerous forms of fevers, the bowels are readily acted upon by purgatives, and the evacuations are generally feculent, although varying in colour and consistence, according to the abundant flow of bile, and the nature of the purgatives employed. When the discharge from the bowels gives relief from pain or uneasiness, and reduces fulness in the abdominal regions, a favourable form of fever may be expected. On the contrary, when the most active purgatives are required to procure an evacuation, the stools being watery, scanty, and offensive, or otherwise morbid, and voided with a sense of confinement and stricture, the abdomen being full, tense, hot, and uneasy, a severe form of disease may be looked for, attended with much danger. In many of such cases, especially if accompanied with signs of vascular determination to the internal organs, or great vascular excitement of the system generally, local or general depletion is indicated. When copious feculent discharges follow the above state, then a favourable crisis may be expected.

Frequent, scanty, bilious evacuations, presenting every variety of colour, from a light green to a greenish black, or from yellow to a greenish yellow, sometimes watery, at other times mucous and streaked with blood, occasionally feculent and extremely offensive, accompany the worst forms of bilious fevers, and indicate much danger, especially if they assume a pitchy appearance. When the stools present a smooth, dark-brown, or blackish appearance, like to molasses, the case is generally extremely unfavourable. A similar remark is applicable to the evacuations that betray an intimate admixture of blood, or bloody sanies, or a purulent mucus, with the other matters of which they consist. These appearances generally indicate very serious organic changes in the mucous surface of the small and large intestines, and often also of the liver.

The state of the *urine* varies much in the fevers of warm climates. This secretion generally is more or less changed from the healthy state. It is always more scanty than it is in health. When the premonitory signs of fever first make their appearance, it is often pale and copious; but as reaction becomes fully formed, it is more and more scanty, higher coloured, or more red. In proportion as it is diminished in quantity and higher coloured, the disease may be considered as being severe. In the most dangerous forms of continued or remittent fever, particularly those which are characterised by symptoms of increased action of a morbid kind, and which soon assume the malignant or adynamic states, the urine is

extremely scanty, and the secretion of it nearly suspended. If, in addition to being scanty, it presents a muddy, or greenish-brown, or greenish-black appearance, great danger may be apprehended. A greenish or greenish-brown hue of the urine is often remarked in the severe forms of bilious fevers, sometimes with a muddy state, and occasionally with darker-coloured clouds floating in it. When this kind of urine becomes paler, deposits a sediment, especially if it assumes a brick colour, and becomes more abundant, a favourable change is about taking place. If this secretion becomes more copious and more natural, with a due deposit, the subsidence of the febrile excitement has commenced.

A sense of *anxiety* at the epigastrium and præcordia, with impatience of pressure in these situations, generally accompanies the worst forms of fever; and when attended with great restlessness and change of place, or of one posture to another, should be looked upon as a most unfavourable symptom. It is often attendant upon, or ushers in, the dark, grumous vomiting which accompanies the most malignant or disorganising forms of fever occurring in warm climates.

The *sensibility* and *excitability* of the frame vary much in different forms and types of fever, and even in different stages of the same form of disease. During the stage of excitement or reaction, when it is moderate in degree, and not accompanied with a disorganising tendency in any particular organ, the sensibility is often increased, and the excitability of the system augmented; but at the same time both are equally diffused. When the disease assumes, from the beginning or in its advanced stages, marked depression of the powers of life, with symptoms of a malignant or disorganising tendency, the excitability of the frame is evidently diminished, either by the causes of the disease, or by previously increased action, or by both; and, in such cases, it is often at the same time unequally diffused, or concentrated in those viscera which are most remarkably diseased.

When the extremities and surface of the body are cold or clammy; the skin thick, dry, and loose, the countenance sallow and collapsed, with a caustic heat at the epigastrium, &c.—we may generally consider that the excitability of the system is unequally diffused, and diminished in some organs and structures, and perhaps augmented in others, more particularly if there be present, in addition to those signs, morbid irritability of the stomach and bowels, and discharges of dark-coloured or otherwise morbid matters.

In many of those forms of fever which are characterised by active determination of the circulating fluid to the brain, followed by stupor, black tongue, low delirium, or coma, &c., the excitability of the frame generally seems to be suppressed by the cerebral congestion, as well as unequally diffused throughout the body. In all such cases the prognosis should be unfavourable. On the other hand, when the sensibility and excitability seem neither to be suppressed nor diminished, nor unequally diffused, the surface of the body, as well as the nervous system, still retaining their susceptibility to external and internal impressions, a favourable issue of the disease may be anticipated.

Morbidly increased sensibility and excitability, especially when carried to an unusual height, giving rise to violent spasms and convulsions, or increased activity of all the senses, are symptoms of a severe disease, and indicate a tendency to exhaustion or collapse, in proportion to the degree of sensibility displayed. This is often shown in those forms of continued fevers which are prevalent during the hot season, and which are generally characterised by great determination of blood to the head.

The functions of the *brain* and *nervous system* are more or less disturbed in all fevers, especially in those of the inflammatory and bilious forms. In very many of the inflammatory continued fevers which take take place during the hot season, and which depend in a great measure upon the elevation of the temperature, fatigue, exposure to the sun, and intoxication, the encephalic character is extremely conspicuous from the first development of febrile action to the close of the disease; and, upon the examination of the fatal cases, the brain and its membranes generally betray the consequences of increased vascular action; such as injection of the vessels of the membranes; effusion of serum in the ventricles, or between the cerebral envelops; red points in the substance of the brain, with softening or hardening of its structure in many cases.

During the course of fever, the functions of the brain and of the senses require close examination; and as intimately related to them, the states of sleeping and waking also are deserving of notice. If the sleep be sound and refreshing, undisturbed by frightful dreams or sudden startings, a favourable issue is indicated; but in proportion as the sleep deviates from this state, is severity of disease and danger to be apprehended. An agitated, unfreshing sleep indicates increased vascular action of the brain; and this is still more to be dreaded if there be continued watching. Want of sleep frequently

precedes delirium in some one of its forms. Stupor, and a great desire of sleep without obtaining it, indicates great danger, especially when it occurs in the more severe forms of fever.

Violent and furious delirium, with great excitement of the circulation, irritable state of the pulse, crimson-coloured and injected countenance, prominent eyes, and rending headach, often accompany the worst forms of inflammatory fever, and indicate a state of vascular excitement, which will soon be productive of collapse of a most formidable nature, even if the brain or its membranes escape immediate and irremediable mischief. If the delirium be accompanied with convulsions, startings of the tendons, epileptic fits, muscular agitations, and tremors, the danger is great, and often near at hand. It is not less certain, although somewhat delayed, if followed by profound coma, relaxation of the sphincters, and involuntary discharges, &c. A mild delirium is not unfavourable, when unattended by signs of malignancy or exhaustion of the powers of life; and if it follow a state of stupor, it is often indicative of recovery. Very lively and extremely low or depressed delirium, all bespeak danger, but the latter especially. When the delirious patient expresses himself to be dying, he is generally right, even although there may not be many signs of danger evident. Indifference to death, with an apparent desire for it, rather than be at the trouble of resorting to the means of recovery, or a firm persuasion of his being perfectly well, are generally unfavourable signs.

A calm, serene, and animated *eye*, in the early stages, usually indicates a favourable form of fever; and this state of the organ, in the advanced periods of the disease, shows approaching recovery. An agitated, wild, painful, confused, muddy, prominent, and turgid state of the eye is unfavourable, indicating a severe form of fever when present at its commencement, and great danger when observed in the advanced stages, especially if the white of the eye become of of a dusky yellow. Intolerance of light indicates great excitement of the vessels of the brain; and rolling of the eyes, with a wild, unfixed stare, often precedes severe paroxysms of delirium, convulsions, and coma. A dull, sluggish state of the eye, want of animation, and sinking into the socket, a dark hue of the conjunctiva, with a sad expression, are all unfavourable signs. A pearly whiteness of the eye, with agitation and prominency, is a symptom of dangerous congestion of the liver and lungs, and, if succeeded by a dirty-yellow hue, indicates approaching dissolution.

CHAPTER II.

ON THE TREATMENT OF FEVER, AS IT OCCURS AMONG EUROPEANS RESIDENT IN WARM CLIMATES, PARTICULARLY IN INDIA.

ALTHOUGH the different types and forms of fever described in the preceding sections, with their complications or local affections, comprehend the most marked varieties, yet there are numerous modifications of those forms, the one passing insensibly into the other, all requiring some variation in their treatment, according to the different shades which they present. To point out the treatment appropriate to such subordinate conditions of disease would be impossible, owing to their extreme diversity; but the practitioner, if he possess clear views as to the management of those forms of fever which have been particularised, and of the complications which they present, will be at no loss as to the treatment of such as peculiarity of circumstances may have rendered somewhat different from those more familiar to him. When he detects differences or modifications, he will be naturally led to inquire into their causes; and if they be referrible to external agencies, he will be induced to remove their operation from the patient, or to counteract them when removal is impossible.

In the treatment of intertropical fevers, as occurring amongst Europeans, we should employ such remedies as are the best calculated to remove the morbid actions going on in the system, without trusting to the supervention of a spontaneous crisis. It is true that crises frequently supervene in the milder forms of fevers, especially when left chiefly to nature; and that the employment of very active or decided methods of cure often interferes with them, and prevents their supervention, inasmuch as such methods are often subversive of that state of system which leads to critical discharges. But in the great majority of cases of fever in the European constitution in warm countries, it would be generally dangerous, and often fatal, to wait the supervention of a spontaneous crisis; for, long ere it could be brought about, some vital organ would receive

'rievable iniury, or the energies of the frame might be entirely

subverted. Without waiting, therefore, for the appearance of such changes, and not attending further to them, when they do occur, than in promoting their full operation and influence, and in adopting the indication to which they may point, we should observe the maxim inculcated by Sydenham, to moderate excessive action as soon as it supervenes, and to restore action when it is diminished much below the healthy standard.

The observations I am about to offer on the treatment of intertropical fevers, as they occur in European constitutions, will first have reference to their different types, forms, and complications; and next to the modes of employing the principal remedies in this class of diseases.

SECT. I.—*On the Treatment of the different Forms of Intermittent Fever, Simple and Complicated.*

The treatment of intermittents has reference to two particular states or periods of the disease, namely, during the paroxysm and the interval. If the symptoms of the cold stage of the paroxysm of intermittent be severe, they should be moderated, lest the internal organs and the powers of life be injured by its long continuance, and by internal congestions, especially in the brain, liver, spleen, and lungs, which frequently supervene during a severe cold stage of the paroxysm. Amongst the best means adapted to the moderation of the cold stage, are the hot or vapour-bath, followed by frictions of the surface of the trunk and of the extremities, the internal administration of warm stimulants, as camphor, ammonia, ether, warm wine, or warm brandy and water, and other remedies of the same class.

These means generally bring about reaction, or the hot stage, which usually terminates in a spontaneous crisis, generally in a copious perspiration, unless some local affection supervene in the course of the paroxysm and prevent its full development. When the vascular action in the hot stage is excessive, particularly if it be accompanied with great determination to the head, with delirium, or to the liver or spleen, with symptoms of inflammatory action in these viscera, we should resort to those remedies which are the best calculated to reduce it. Amongst these, the employment of general or local blood-lettings is often serviceable, especially in the plethoric, in those lately arrived in the climate, and the highly fed. When general depletion seems to be too active a measure for the patient's strength, local depletions should be employed, and are

always of great service. Under the above circumstances, either the one or the other ought to be resorted to, in order to guard important viscera from danger, and prevent the supervention of those internal congestions, obstructions, and inflammations, with which agues are so frequently complicated in the European constitution, when this means and free purgation are neglected in the early periods of the disease.

In addition to moderate depletion, when vascular action runs high, and the skin is hot and dry, cold affusion, and the internal use of cooling diaphoretics, as the nitrate of potash, acetate of ammonia, camphor julep, antimonials, &c. are always beneficial, and generally promote the speedy supervention of the sweating stage. When we find that the previous paroxysm of the fever has been characterised by a very long hot stage, with symptoms of determination to the head, or to any of the abdominal or thoracic viscera, the sweating stage being imperfect, and the patient complaining of uneasiness in the seat of any important viscera, general or local depletions, particularly the latter, are usually requisite.

Having conducted, by the above means, the paroxysm to a safe conclusion, our treatment should be strenuously directed to its prevention. If the fit is mild, and not accompanied with any local determinations, very little interference on our part during its continuance is necessary. But our endeavours to prevent the return of the paroxysm of a mild nature should be equally strenuous with those resorted to in order to arrest the more severe disease; for although the previous fit has been slight, a severer one may follow; and we know not the extent of evil which may be produced in an important internal organ during even a comparatively slight paroxysm. Moreover, frequently repeated paroxysms of a slight nature lay the basis of organic lesion, and lead to disease which may ultimately terminate the life of its subject.

After the paroxysm, and especially if the patient has been recently affected by the disease, an emetic should be administered, and its operation encouraged by the free use of diluents. The advantages resulting from the use of emetics upon the invasion of febrile diseases, have been proved on numberless occasions. But, in order to ensure their full effects, without the risk of inducing or developing inflammatory action, they should be administered when there are no urgent symptoms of active determination to the brain present, nor any sign of inflammation of the stomach, liver, or spleen. If given sufficiently early in fevers, whether intermittents, remittents, or the continued type, when these conditions of the organs which contra-

indicate the exhibition of emetics have not yet supervened, and, when followed by an appropriate method of cure, they are prevented from appearing by employing them.

After the operation of the emetic, a full dose of calomel, of from fifteen to twenty grains, should be exhibited, and, about three or four hours afterwards, followed by a purging draught. If these act not sufficiently upon the bowels in a few hours, their operation should be assisted by the administration of a cathartic enema. Having thus promoted the discharge of morbid secretions and fæcal accumulations, and removed local congestions by blood-letting, we may resort to the exhibition of bark, so as to prevent the accession of the paroxysm. Unless purgatives have been employed previously to the exhibition of the bark, so as effectually to carry off morbid accumulations, and unless local determinations of blood and congestions are removed by general or local depletions, we shall resort to this most valuable medicine to little purpose; for it will either not be retained on the stomach, or it will fail of producing its febrifuge effects if retained, and occasion obstruction and enlargement of the liver and spleen.

When the stomach nauseates or rejects the bark, I have often found that the exhibition of a full dose of calomel and opium, shortly before its exhibition, has caused it to be retained. This difficulty is now happily got rid of, since the introduction of the sulphate of quinine into practice, which possesses the efficacy of the bark, and has the additional advantage of being less offensive to the stomach, and admits of every mode of administration in a small bulk, or in whatever form may be most agreeable to the patient. The best mode of exhibiting the bark in substance, is to give it in large doses, combined with ammonia, camphor, or ginger, some time before the expected accession of the paroxysm.

Whilst the bark is being exhibited, particular care should be directed to the state of the biliary and alvine functions: full doses of calomel ought to be prescribed from time to time, according to the exigencies of the case, and followed by active purgatives and enemata. If a free state of the alvine functions is not preserved during the employment of the bark, and all morbid secretions and fæcal matters removed before its exhibition, the danger of inducing obstruction and enlargement of the abdominal viscera, and determination to the head, is extremely great.

When intermittents, of whatever type, are treated in this manner at their commencement, they generally yield in a short time; but if they have been of considerable duration when the treatment

commenced, the difficulty of removing them is often great. In such cases, congestion or obstruction of some of the abdominal viscera has probably taken place, tending to perpetuate the disease, and to render the exhibition of bark, or any of its substitutes, much less beneficial than it would otherwise be. Here we must not only commence the treatment with local depletions and the exhibition of purgatives, consisting chiefly of calomel and the other medicines of this class already particularised, but we must continue to exhibit purgatives or laxatives daily until the secretions and evacuations assume a healthy appearance, and the tongue begins to clean. When these effects are produced, the bark may be exhibited; but they ought, more especially at the commencement of its administration, to be either combined or alternated with active purgatives.

It is chiefly owing to the neglect of this practice that diseases of the liver and spleen so frequently supervene in the course of agues. First, congestion takes place, and it is followed by impeded secretion and morbid depositions in the substance of the viscera. These often lead to inflammatory action, especially if bark or arsenic have been administered freely during the states of congestion and obstruction. When the patient also is subjected to the continued influence of malaria during the treatment, the obstinacy of the malady, and the complications which supervene in its progress, are in a great measure to be imputed to this circumstance. The removal of the patient or patients to more healthy localities is here imperatively called for. But when this cannot be done, we must trust to the energetic employment of the remedies already particularised, keeping it always in view to remove all morbid secretions and fæcal matters daily, to improve the secreting functions, and to make a powerful tonic impression upon the system, by means of the sulphate of quinine or bark given in as large doses as the stomach will bear, combined with those medicines which are the best calculated to heighten its febrifuge effects, and prevent it from offending the digestive organs. Amongst these, the different preparations of ammonia, æther, camphor, opium, ginger, pepper, cinnamon, and other aromatics, are the most beneficial.

The bowels of the patient ought always to be acted upon so as to procure three or four evacuations daily, and the purgatives by which these are procured should be calculated to promote the biliary and pancreatic secretions. Calomel in full doses at bed-time, either alone, or with antimony or opium, and the purging powder, or bitter aperient mixture, with the addition of the sulphate of magnesia, given early in the morning, are amongst the best medicines.

we can employ. When the spleen is much enlarged, and while the patient is subjected to the enervating influence of malaria, calomel must then be given with greater caution, and its effects carefully watched. In cases of this nature, the purgatives selected should always be prescribed in combination with a tonic; and here I have found the decoction of cinchona with the sulphate of magnesia and tinctures of jalap and senna extremely beneficial. The sulphate of quinine may also be given with the sulphate of magnesia in similar cases, with equal advantage. It is chiefly by the energetic employment of tonics and purgatives combined, that we can expect to remove enlargement of the spleen, whether occurring in remittents or intermittents.

When the liver becomes enlarged, and more particularly if it seem to be also tender or painful upon a cautious examination of the abdomen of the patient, leeches ought first to be applied, followed by poultices, a blister, or a plaster composed of equal parts of the empl. ammon. cum hydrarg. and the empl. picis comp.; calomel in full doses ought to be given at bed-time, and a free action kept up in the alimentary canal by means of deobstruent purgatives, as already pointed out. In enlargements of the liver, as well as of the spleen, advantage will often accrue from the insertion of an issue somewhat below the seat of tumefaction or of pain.

In many cases of the complicated or irregular forms of ague, especially where the patient has been ill for some days before he has submitted to treatment, the intermissions are attended with a considerable degree of uneasiness and sense of languor, with a foul, loaded tongue, want of appetite, and deficient energy of the whole frame. In cases of this kind, the abdomen and hypochondria are often full or tumefied, and even tender upon examination. Here there can be no doubt of the propriety of exhibiting purgatives, commencing with large doses of calomel, and of repeating them daily, until the fulness, sense of load, and foulness of the tongue, are removed. But in many of those cases, we should not defer the exhibition of bark until the tongue is clean, or the evacuations assume a healthy appearance. If we do defer it until these ends are attained, the patient may sink under the operation of the purgatives. The condition of the tongue must be carefully watched, for although moist, it may yet be loaded; in this state, and with an improved condition of the alvine evacuations, much good will be derived from the use of the bark, particularly when associated with proper purgatives.

In all cases of protracted ague, of ague supervening to remit-

tents, or the continued type of fever, and of the irregular or duplicated types of the disease, we should be assured that either the liver or spleen, or both, is in a state of chronic disease. Here the abdomen of the patient and the state of the evacuations should be daily examined, and the treatment directed according to the inferences we may draw from a careful examination of the phenomena of the case. If the liver be affected, or the spleen, or the functions of the bowels, or the stomach, we must put in practice the means of cure already recommended when the diseases of these viscera respectively were under consideration. At the same time that we endeavour to remove the complication, or the visceral disorder, we should remember that we have also to cure the disease which induced it—to arrest the ague. Therefore, the exhibition of the bark, either at the same time, or alternately with the other remedies which the circumstances of the case may demand, should not be neglected, but be pushed to such a length as its effects, in respect both of the fever and its complication may warrant.

SECT. II.—*On the Treatment of the different Forms of Remittent Fever occurring amongst Europeans in Warm Climates, particularly in the East.*

The treatment which has been recommended in the foregoing section is altogether applicable to the *mild* and *uncomplicated* forms of remittent fever. At the commencement of the disease, and when there are none of the indications already enumerated, to prevent their exhibition, emetics should be given; for if resorted to sufficiently early, they are always of the most essential service. After their full operation, a large dose of calomel, or of calomel and opium, may be prescribed, which should be followed by purgatives and cathartic enemata, and when these means have been repeated, so as to accomplish fully the ends of their exhibition,—namely, to remove all morbid secretions and accumulations, and promote a free and healthy secretion of the internal viscera,—bark may be resorted to in the remissions. But care should be had not to give this medicine during active determinations to the head, liver, lungs, or spleen, until such complications have been removed by vascular depletions, either general or local, and by the judicious employment of whatever means the particular circumstances of individual cases may require. When the *prima via* has been sufficiently cleansed by the action of emetics and purgatives, and there appears to be no affection of any internal organ to contra-indicate

its employment, the bark, or the sulphate of quinine, may be given in the manner directed in the foregoing section.

In the *inflammatory* and *bilious* forms of remittent fever, our practice, particularly early in the disease, must assume a more energetic character. If the patient comes before us upon the invasion of the disease, and when there is no inflammatory determination of blood as yet induced in either the head, liver, or stomach, an emetic is of great service, and ought not to be neglected. In these forms of remittent, and particularly if these viscera be affected, vascular depletion, either general or local, or both, ought to be instituted, according to the degree of vascular excitement present, the habit and constitution of the patient, the circumstances in which he is placed, and the character of the endemic or epidemic influences to which he is subjected. In order, however, that depletion may be attended with its full effects, it must be practised early in the disease. If omitted until the vascular excitement has partly exhausted the powers of the system, its beneficial effects cannot be obtained; and the nature of the derangements induced, and the state of the powers of life, can then admit only of local depletions, which, however, ought to be employed, in order to remove such congestions as may have taken place locally in the progress of the disease.

In addition to general and local depletions, the exhibition of full doses of calomel, followed by purgatives and laxative enemata, are requisite, and should be repeated until morbid matters are entirely removed. During the vascular excitement which accompanies the early stages of the inflammatory forms of remittents, particularly when the skin is hot and dry, the cerebral symptoms strongly marked, and the abdominal viscera free from congestions, cold applications should be kept to the head, and the cold affusion frequently resorted to. When the powers of the frame have been exhausted either by the duration of the disease, by the influence of its efficient causes, or by the previous excitement, and when the abdominal or other internal viscera furnish indications of congestion, the cold affusion is generally a hazardous measure; for the frame is unable to bear the shock which it occasions, and the circulation which is repelled by it from the surface is thrown upon the diseased organs, so as to heighten the congestion from which they are already suffering, and to lead more rapidly to organic lesion.

Where, with the affection of the internal viscera, there is present much heat of surface with a quick, irritable pulse, and dryness of skin, more advantage will be obtained either from the tepid bath or cold sponging of the surface of the body, than from cold affusion.

By these means, the irritation of augmented heat will be removed, and the vessels of the skin relaxed, without diminishing the determination to the external surface of the body. In order to obtain beneficial effects from the cold affusion in remittent fever, a certain degree of integrity of the vital powers is requsite; and where this remains, with a hot, dry surface, it may be employed with advantage. But when exhaustion or collapse has supervened, or congestive states of disease taken place in the internal viscera, we should never attempt it.

When the head is much affected, as it frequently is, during the progress of the inflammatory and bilious forms of remittent fevers, leeches will be employed with advantage to the temples and occiput, the hair being removed, and evaporating lotions applied to the scalp. Care, however, should be had, especially during the progress of the fever, not to lower too far the nervous energy of the frame by these means. As to the extent to which they may be carried, or the duration of their application, the practitioner will be guided by the heat of the head, the force of the pulse in the carotid arteries, and the expression of the patient's countenance.

When the sense of the heat in the epigastric region, with pain, tenderness, fulness, nausea, and vomiting, indicate desease of the stomach, in the inflammatory or bilious forms of remittent fever, our means of cure should be directed in such a way as shall preserve this viscus from organic lesion. In the most concentrated states of this fever, the stomach is one of the viscera which suffers the most: it is often the most affected of any. When this is the case, the quantity of viscid, frothy, or ropy matter which is vomited is often extremely great. When the disease is attended with increased secretion of bile, as it often is, the matters brought up are generally bilious, sometimes remarkably so, being yellow, green, or greenish-yellow, and sometimes of a dark-green colour. When the matters thrown from the stomach are not mixed with bile regurgitated from the duodenum, they are then of a whitish or colourless appearance, and sometimes mixed with albuminous flakes and froth. But the repeated vomitings which accompany this state of disease generally induce an increased discharge of bile, and regurgitation of it into the stomach. If this fluid has been long retained in the biliary apparatus, or secreted in too great quantity, or of a more than usually acrid quality, it generally heightens the state of disease in the stomach, which, as indicated both by the nature of the fluids vomited, and by the sense of pain, heat, and tenderness complained of in the epigastric region, is evidently inflammatory in its nature.

In cases of remittent fever, where the above symptoms are prominent, vascular depletion is imperatively requisite; but, to be beneficial, it must be practised early, and before the coats of the viscus have been injured. When inflammation of the stomach supervenes in the progress of intertropical fevers, it runs rapidly into organic change, and the energies of the system are very quickly exhausted. Therefore, our means of cure, in order to be successful, must be not only judicious but promptly employed. When the state of the patient admits of it, general depletion should be practised; but, in every case of this description, the application of a large number of leeches, followed by hot poultices, and these by a large blister, ought never to be neglected. While these means are being employed, a large dose of calomel and opium, followed by a purgative in the morning should be given, and repeated according to the effects produced and the particular circumstances of the case.

Having, by these means, allayed the irritability of the stomach, as well as the inflammatory action affecting it, our next object should be, to carry off acrid, bilious, and morbid secretions and fæcal accumulations. Purgative injections should be thrown up, and those medicines given by the mouth which are the most likely to operate fully on the bowels without offending the stomach. In the intervals between the exhibition of these, cooling diaphoretics, consisting of the liq. ammon. acet. with camphor julep, and small doses of the nitrate of potash, may be given.

When there are evident signs of inflammatory action having been induced in the liver, vascular depletions, and the other means insisted upon when treating of the diseases of that organ, are requisite. In cases of this nature, as well as in those forms of complication with inflammatory action of the small and large intestines noticed when the types and forms of fever were under consideration, local depletions, followed by the application of hot poultices or fomentations, and then by blisters, are necessary. In all the above states of disease, these measures should be employed early; for organic change is soon produced by the local inflammations supervening in the course of fever, and, once induced, they either lead to irremediable disease, or destroy the patient. Hence the practitioner ought to watch carefully the progress of intertropical fevers from the first moment that a case of it comes before him; and as soon as local determinations or inflammatory action in vital organs takes place, he should act with decision, and leave nothing to nature.

In cases where symptoms are present indicating inflammatory

action in the bowels, the exhibition of full doses of calomel with opium, immediately after the local depletion, is extremely beneficial; and when the local depletions require to be repeated, the dose of calomel and opium should be repeated also. Gentle purgatives and laxatives may be next prescribed, and assisted with emollient and laxative enemata. If dysenteric symptoms be present, the injections may be anodyne as well as emollient, especially after morbid secretions and accumulations have been carried off. The use of cooling diaphoretics between the exhibition of purgatives or laxatives, is extremely serviceable; and if soreness and disorder of the bowels still continue, the application of a large blister on the abdomen is necessary. In all cases where the abdomen continues tumid, the tongue loaded, and the evacuations morbid, the use of purgatives and laxative injections should be persisted in, especially, if the patient complain at the same time of fulness in the hypochondriac and epigastric regions.

Having removed, by the above means employed early in the disease, the increased vascular action characterising the commencement of the inflammatory and bilious forms of remittent fever, and having thereby arrested the local inflammations which often arise in their course,—in the inflammatory form, from the general excitement having induced increased determination to a predisposed organ, and in the bilious form, from the irritation occasioned in the stomach and bowels by the excessive discharge of accumulated bile of an acrid nature,—debility or exhaustion of the energies of the system is often the chief condition of disease against which we have to contend. If the patient be removed from the local causes which produced the fever, and enjoy a healthy atmosphere, the above means are frequently of themselves sufficient to cure the disease, the functions of the secreting organs generally returning as soon as the morbid excitement of the system is restrained, the local determinations removed, and morbid secretions and accumulations discharged from the body.

But if the patient continues to be subjected, during the progress of the fever, to the same exhalations and influences which caused it, so favourable an issue of the above means is not to be expected. The previous excitement, as well as the continued operation of the causes of the disease upon the vital energies of the patient, necessarily are productive of exhaustion, although to a much less extent than if the means of cure specified above had not been resorted to. Accompanied with this exhaustion, in the more favourable cases, will be observed a more or less complete remission of the febrile

symptoms. As soon after the employment of the measures insisted upon as such a remission appears, we must change our mode of treatment, and endeavour to prevent the return of the fever, and preserve the energies of the frame against the depressing agents which surround it, and the exhaustion consequent upon previous excitement. At this period, bark may be ventured upon in the manner already noticed, and its effects carefully watched. As long, however, as the tongue continues dry, excited or rough, and the skin hot, dry, and harsh, the remains or consequences of local determinations and inflammations are still unsubdued, and its exhibition is contra-indicated. Whilst, therefore, these symptoms are observed, local depletions, tepid or warm bathing, purgatives, diaphoretics, and external irritants, are required.

When exhaustion supervenes in the advanced stage of remittent fevers, even of those which in their earlier periods, presented the inflammatory, bilious, or complicated states in the highest degree, the exhibition of bark is necessary, especially if the patient still continues within the sphere of those causes whence the disease proceeded. If this medicine be not employed, although the previous treatment has been most judicious, and the patient has experienced all the benefit it was calculated to afford, there will be considerable risk of relapse, or of the transition of the remittent into an obstinate intermittent form. When febrile action subsides after due depletions and evacuations practised early and judiciously, bark is seldom hurtful; and if it fails of being beneficial, its effects upon the tongue and the pulse will soon intimate the propriety of discontinuing it. When the tongue is moist, the skin soft and perspirable, and the pulse neither irritable nor hard, nor oppressed, nor very quick, this remedy may be exhibited either in conjunction with purgatives or alternately with them. Full doses of calomel, or doses sufficient to promote the healthy secretion of bile, may be prescribed occasionally at bed-time, and followed by a purgative draught early in the morning.

In many of those cases wherein the exhibition of bark seems to be a doubtful measure, the decoction of this substance may be used and combined with the sulphate of magnesia and a purgative tincture; or the sulphate of quinine may be prescribed either with this salt or with the sulphate of soda, so as to keep up a gentle operation on the bowels. If calomel has been given in full doses early in the disease, and the bowels well evacuated during the progress of the fever, the blue-pill, either alone or with ipecacuanha, or with the compound aloes pill, may be taken at bed-time, while the bark is

exhibited in any of the above forms through the day. It is chiefly in such cases as have been neglected in the early stages of the disease, and in which depletions and purgatives have been either omitted or insufficiently practised, and laid aside upon the commencement of the exhibition of bark, that this medicine either fails of producing its good effects or proves detrimental, occasioning congestion, obstruction, or secondary inflammation in the liver.

In those forms of remittent fever which present the *adynamic* or *malignant* states of disease, either in a primary or secondary shape, our means of cure must chiefly be directed to the removal of morbid secretions and accumulations from the *prima via*, and the restoration of the secreting functions of the internal viscera and of the vital energies of the system. In the more malignant and concentrated forms of fever proceeding from terrestrial exhalations, these ends are obtained with great difficulty. In those forms of the disease which commence with great excitement of the internal organs, and a state of tumultuous vascular action, concentrated chiefly in the viscera of the large cavities, principally in those of the abdomen, blood-letting, either general or local, or both, should be practised at the commencement or early periods of this state, especially in persons of a robust, plethoric, and sanguine constitution. If this concentrated state of internal disease be not moderated soon after its supervention by means of depletion, the vital energy of those viscera which experience the morbid action in the highest degree is soon exhausted, and organic change, with collapse of the powers of the frame, soon supervenes, with all the phenomena to which the term malignant may be appropriately given.

In cases of this description, emetics are beneficial at the invasion of disease only, and before the above state of concentrated and internal morbid action has supervened. The irritable and inflamed states of the stomach and liver which frequently mark the stages of reaction in this form of fever, forbid the exhibition of emetics after the earliest period of invasion has passed away, and increased vascular action taken place. Having instituted depletion, either general or local, at the commencement of the stage of excitement—the only period of this form of remittent at which it is admissible—our next object is to allay the great irritability of the stomach, generally present in this form of the disease. With this view, a large dose of calomel, or of calomel and opium, should follow the vascular depletion, and be repeated according to its effects, and the circumstances of the case. One of our chief objects is to promote the secreting functions of the liver, stomach, and bowels, or to correct

them, by the exhibition of calomel, as well as to diminish morbid action in the stomach itself. In many of the cases of fever which proceed from malaria, and assume the severest form, the secretion of the liver, is either interrupted or entirely suppressed, as observed in the worst cases of the marsh-hill or jungle fevers, which are common in many parts of India. Here the large doses of calomel alone are most serviceable, followed by purgatives, and repeated according to the particular circumstances of the case; and, conjoined with the use of the warm bath, frictions on the surface of the body and extremities should be resorted to, and a large blister applied to the hypochondriac and epigastric regions.

While I thus recommend vascular depletion in the more concentrated and inflammatory states of remittent, which rapidly pass into the malignant and adynamic forms, I would not be understood as advising it in those cases in which the powers of the frame are insufficient to bring about reaction of the vascular system; at least it should never be employed until efforts at reaction appear, when a small blood-letting, either generally or locally, may be practised, especially if the warm or vapour-bath, and frictions of the surface, precede it. The advantages which are derived from a small or moderate blood-letting in this state of disease, consist chiefly in the relief it affords to the overloaded vessels of the large internal viscera, and to the congestion of the venous trunks and auricles of the heart.

When an adynamic state of system is present throughout the whole progress of remittent fever, from the earliest impression of its exciting causes, with a raw surface of the extremities, harsh state of the skin, weak pulse, foul black tongue, offensive and morbid evacuations, &c. we must endeavour to rouse the vital energies of the frame by means of the hot or vapour-baths, followed by assiduous friction of the extremities with stimulating substances. A blister or mustard cataplasm should be placed upon the region of the stomach and insides of the thighs, and stimulants combined with antiseptics given internally. Of these latter remedies, the preparations of ammonia, the æthers, camphor, and the warm spices and aromatics, combined with the bark either in substance or in decoction, are the most beneficial.

A similar mode of treatment is indicated when the adynamic or malignant state of system supervenes to that of morbidly increased excitement and vascular action. Both conditions of the frame are generally accompanied with great irritability of the stomach, and the rejection of matters possessed more or less of morbid appear-

ances. Frequently in the last stage of the disease, following the state of concentrated and imperfectly developed action, the matters vomited are dark-coloured and grumous, and the surface of the body yellow, or of a dirty sallow appearance. This is an extremely unfavourable condition, and indicates a rapid exhaustion of the power of the capillary vessels. During the adynamic or malignant states, whether they occur primarily or supervene secondarily, a nearly similar mode of treatment is necessary. The irritability of the stomach, however, accompanying the secondary state of exhaustion, is much more violent, and less under the control of treatment, than that attendant upon the primary state of oppression: in the former, the powers of the organ are exhausted and its organisation injured; in the latter, they are oppressed merely, or at least simply diminished, and often admitting of restoration by means of powerful stimulants.

In the adynamic or malignant states of remittent fever, therefore, accompanied with irritability of the stomach, we should endeavour to allay this latter symptom. A large rubefacient cataplasm, or a large blister applied over the epigastric region and insides of the thighs, will often have this effect: so will a full dose of calomel and opium, in many cases, but not in all, especially in those where the energies of the organ are greatly depressed, and where the irritability is not a consequence of inflammatory action, or, if a consequence of such action, a remote one merely, and rather the immediate result of exhausted power. In all such cases of exhaustion or great depression of the powers of this viscus, attended with vomiting or a pumping up of its contents, and of matters immediately after they are received into it, cordial stimulants should be employed in addition to the means applied externally, and the exhibition of calomel and opium; of the aromatic spices combined with ammonia, the æthers, camphor, opium, &c. are the most beneficial. In cases of this description also, substances which evolve the carbonic acid gas are very beneficial, owing to the strong impression made by them upon the organ. Hence spruce beer, bottled stout, or porter, are generally much relished by the patient, as well as administered with advantage.

During this state of system generally, and of the stomach in particular, bark in substance can scarcely be retained; however, when retained, it is frequently of great benefit. It is most easily borne by the stomach when combined with the ammonia or hot spices and opium. It may also be taken in powder with much benefit, in the following manner:—mix the bark in substance with

a little ammonia and bottled stout, in the bottom of a large glass, so as to make it a thick fluid, then fill up the glass from the bottle as soon as it is opened. The briskness of the bottled beer will both cover the taste of the bark and cause it to be retained on the stomach. In this way, the sulphate of quinine also may be easily taken. There is, perhaps, no state of disease occurring within the tropics wherein the advantages promised from the discovery of this valuable preparation of bark are so very apparent as in the one now under consideration.

During the adynamic or malignant forms of remittent fever, while we endeavour to rouse the energies of the frame and allay the irritability of the stomach, we should not neglect to carry off the morbid secretions and fæcal accumulations from the bowels, which, if allowed to remain, would lower still further the powers of life, and endanger the supervention of disease of the bowels, under which the patient would rapidly sink. With this view, calomel should be given by the mouth, and purgative or laxative enemata frequently administered. Whilst we endeavour to promote and improve the secretions, and remove them from the bowels, we should avoid the use of those medicines which irritate or offend the stomach, as an irritable state of this viscus, when once induced in the above forms of fever, is not easily removed.

Amongst other remedies which may be employed in those states of the system which are attended with diminished energy of the powers of life, the sp. ammon. arom. or succin., the sp. æth. nitr., the compound tincture of cardamoms, the compound tincture of camphor, the æthers, and the various tonic and antispasmodic preparations in common use, may be exhibited in conjunction with tonic and aromatic infusions, and small doses of opium, according to the circumstances of particular cases.

If an irritable or dysenteric state of the bowels supervene in the course of remittent fever, we may generally attribute this circumstance to the irritation of morbid secretions and fæcal accumulations in the *prima via*. In these cases a full dose of calomel should be given, and be followed by castor oil, or the purging powder, or the bitter aperient mixture; and, in a few hours, aperient or laxative enemata should be administered so as to remove morbid collections; after which, anodynes, with gentle alteratives and light tonics, or the bark with aromatics, may be exhibited.

If this state of the bowels supervene during the adynamic or malignant forms of disease, whether these be primary or secondary, and the motions are very dark, pitchy, offensive, or otherwise mor-

bid, the case is extremely unfavourable, especially if the abdomen be tumid and painful. In cases of this description, calomel is requisite, either alone or combined with opium and camphor; and the necessity of removing the morbid secretions requires the exhibition of purgatives, whilst the adynamic state of system demands a tonic and stimulating effect to be imparted to the stomach and alimentary canal. The purgatives employed should therefore be combined with tonics; and hence, either the bitter aperient mixture combined with the compound tincture of cardamoms, and other aromatics, should be exhibited; or, if the stomach will bear them, the decoctions of cinchona and rhubarb, with the tincture of rhubarb, or the bitter tincture, should be exhibited according to their effects. The decoction of bark and rhubarb may, at the same time, be administered frequently in the form of enema, and attempts be also made to rouse the energies of the abdominal viscera by frictions with stimulating substances, followed by rubefacient cataplasms or large blisters.

If the remittent assume the continued type, or, which is nearly the same, if the remissions become scarcely distinguishable, the states or conditions of the system being similar to those above treated of, and either the inflammatory, bilious, concentrated, adynamic, or malignant forms of fever being present, according as the case may be, the treatment must still be the same as recommended for each of the above forms respectively, the nature of the phenomena chracterising each of them being no further changed by the more continued type assumed, than that the constitution suffers more decidedly, and the vital energies sink more rapidly, under the unremitting state of disease induced. Hence, the chief change being in respect of the intensity of diseased action, the means of cure appropriate to each form of disorder require not to be changed in kind, but to be administered with greater promptitude and decision.

When remittents assume the intermittent type, as they not unfrequently do about the termination of the rains, and in localities abounding with malaria, when the patients still continue subjected to its influence, we may generally suspect that the liver or spleen, or both, will soon evince signs of enlargement or obstruction, if, indeed, these lesions do not already exist. In cases of this nature, although the active exhibition of bark, the sulphate of quinine, or of arsenic, is requisite, in order to arrest the return of the paroxysms, which, by their continuance, would increase the mischief, yet the active operation of purgatives and deobstruent laxatives is still more

necessary; for without them neither will the obstructions already existing be removed, nor the intermittent disease be safely arrested, nor the bark exhibited with hopes of permanent advantage to the patient. In cases of this nature, change of air is next in importance to the employment of suitable medical treatment; and, in many cases, the one should accompany the other.

Sect. III.—*On the Treatment of Continued Fever, as occurring amongst Europeans resident in warm Countries, particularly in India.*

The continued forms of fever are most prevalent amongst those recent visitors whose constitutions have not been seasoned to the climate, or suffered seriously from disease since their arrival in them. Continued fevers are not, however, restricted to this class of persons; for older residenters are also subject to them, especially during the hot season and the prevalence of epidemic influence. When fever assumes the epidemic form, it is continued in its type as well as remittent, according to the particular circumstances of the individuals affected, the season of the year, and the nature of its exciting and accessory causes. Generally speaking, a continued type of fever indicates either a greater predisposition to disease, or a more energetic operation of its causes. It is always characterised by more intense morbid action in the frame, tending to a more rapid exhaustion of its powers, and greater inability of spontaneous recovery.

The inflammatory and bilious forms of continued fever are the most prevalent, the former especially, in warm countries, particularly amongst the class of persons already alluded to. Indeed, it seems as if great intensity of excitement and of vascular action were requisite in a warm climate to the continued type of fever. But this great augmentation and concentration of morbid excitement exhausts the irritability of the moving fibre with a rapidity proportionate to its intensity, and the patient is sooner or later precipitated from a state of reaction to that of collapse, with more or less of those signs to which the term malignant, as relating to fever, may be applied; unless, indeed, the patient be destroyed before such symptoms supervene, by the sudden injury inflicted upon some vital organ, as the brain or stomach, during the stage of vascular excitement.

In fevers of the continued, as well as in those of other types, the exhibition of emetics upon the invasion of the disease is generally

attended with great benefit. But, to be beneficial, they must be exhibited before the vascular reaction following the invading symptoms is fully developed, and whilst the head, stomach, and liver, present no signs contra-indicating their administration. After their full operation, a large dose of calomel may be given; and purgatives, both by the mouth and in the form of enemata, may afterwards be exhibited.

If blood-letting were proper in cases of the remittent type of fever during the period of excitement, it must be still more requisite in the continued type. Accordingly, as soon as increased vascular action has supervened, we should subdue it by a copious depletion, which ought to be carried to the extent of making a decided impression upon the pulse; and the depletion should be repeated as soon as a return of the increased vascular action is observed, or if we find, after the lapse of a few hours, that the excitement has not been sufficiently allayed by the first blood-letting immediately after the first depletion has been performed, the bowels should be freely and copiously evacuated, especially if they have not been heretofore sufficiently acted upon; and if they have been fully opened, the effect should still be kept up by means of calomel in full doses, followed by cooling purgatives, or by castor-oil, jalap and cream of tartar, &c. In order to relax and cool the skin, and especially if the fever be accompanied with increased determination of blood to the brain, the hair should be removed, cold applications kept to the head, and the cold affusion resorted to from time to time, until a free perspiration breaks out generally over the body. At the same time cooling remedies, consisting of the nitrate of potash, liq. ammon. acet. and sp. æth. nitr. may be given frequently with the camphor mixture, and the patient allowed to drink freely of water, saturated with the cream of tartar, or made pleasant with tamarinds or lime juice.

The prompt and energetic employment of the above measures will remove the increased action generally characterising the early stage of continued fever, and which, if not allayed by these means, would soon exhaust the powers of the frame, and precipitate the patient into a state of collapse and extreme danger. But it very frequently happens, especially when the vascular action has been allowed to proceed without employment of decided and judicious means to subdue it, that some organ, owing to its susceptibility or state of predisposition, becomes affected in a greater degree than the rest of the frame, and is, consequently, threatened with imminent danger. Occasionally, more than one organ or texture are thus affected; and even two, three, or more viscera, sometimes present signs of being

the seat of vascular action, carried to a higher pitch than through the rest of the body.

This condition of disease, or concentration of action to one or more viscera, sometimes appears early in fever; and in many cases not until the general vascular excitement is beginning to be exhausted, when it continues merely in those organs most disposed to increased action, either from inflammation having been kindled in them during the general excitement, or from some other cause not easily to be assigned. When the state of concentrated vascular action appears early in the disease, it will often be removed by the general depletions recommended. When it supervenes at a later period, especially after venesection has been practised, we must then trust to the operation of leeches to remove it, assisted by other measures, selected according to the organ or organs chiefly affected.

When the head becomes principally implicated, general and local depletions, cold applications, the cold affusion whilst the lower extremities are kept warm, purgatives, antimonial diaphoretics, and the usual means resorted to for the purpose of deriving the current of the circulation from the brain, are obviously required. If the stomach seem to be chiefly affected, as is often the case, general bleeding, followed by the application of leeches to the epigastric region, large doses of calomel and opium given internally, purgative enemata, blisters over the epigastric region, &c., are requisite. When the liver furnishes indications of being the seat of inflammatory action, nearly similar measures are also necessary. The stomach is seldom the only seat of increased disease in fevers; the liver generally participates in the local determination, and in many cases it is extremely difficult to say whether the one or the other is most deranged. This occurs more especially in the forms of continued fevers in which the bilious character predominates. In all cases presenting this complication, the means of cure should be of a decided nature, and employed as early as the patient comes before us, or as soon as the symptoms indicating the local affection make their appearance.

In those cases where active depletions and alvine evacuations have been employed at the commencement of the stage of vascular excitement, complications or local determinations less frequently occur. Where, however, these means of cure have been neglected, not only do the above complications supervene, but others also make their appearance of an equally serious nature, such as inflammation of the bowels, dysentery, &c. Whenever the abdomen is tumid, painful, sore, tender to the touch or to a steady pressure,

and especially if it be more than usually hot and dry, the patient complaining of a sense of internal heat, &c., we may rest assured that some of the abdominal viscera are seriously implicated. As to the particular organ affected, the situation of those symptoms, the state of the functions of the respective viscera, the appearance of the evacuations, and of the tongue, generally furnish information, which, if it be not always precise, is yet sufficiently obvious to guide the attentive practitioner to the adoption of a rational and efficient method of cure. If the above phenomena be chiefly referred to the right hypochondrium, we should dread affection of the liver, especially if the other signs of hepatic disease be present. If they be complained of in the epigastric region and left hypochondrium, and if they are accompanied with nausea or retching, disease of the stomach is indicated. If these symptoms are seated in the vicinity of the umbilicus chiefly, the small intestines may be considered as suffering in a marked manner, particularly if the evacuations are either frequent and morbid, or entirely obstructed. If they be complained of in the hypogastric regions and course of the colon, with a dysenteric state of the alvine evacuations, the fever may be considered as offering the very frequent complication with dysentery. When the abdomen is generally tumid, tender upon pressure, sore, or painful, a diseased state of the peritoneum or omentum should be suspected.

In all these forms of complications, there are various other symptoms for which the practitioner should inquire, in order to enable him to decide in his own mind respecting the particular nature of the disorder which has supervened, and the number of organs and textures which has become more especially implicated in the progress of the fever; but the above are sufficient to furnish the indications for further research, and will readily suggest the probable nature of the complication, and lead him to inquire into the expression of the countenance and of the eye, the appearance of the tongue and the mouth, the character of the alvine discharges and the symptoms attending their evacuation, the state of the pulse, and the condition of the external surface, for further and more precise information. But whatever may be the particular modifications these complications present, either in respect of their seat, or as regards the degree of morbid action characterising them, nearly the same means of cure are required for their removal. General blood-letting followed by the application of leeches, calomel in full doses with opium, the use of hot poultices and fomentations on the abdomen, the tepid and moderately warm bath, laxatives, emollient

and laxative enemata, cooling and anodyne diaphoretics, and mercurial preparations with ipecacuanha and opium, are the most efficient means which we can use, and which the zealous and attentive practitioner will readily adapt to the particular circumstances of individual cases.

When continued fever presents complications of visceral disease, especially if the viscera of the thorax and abdomen be affected, I do not advise the cold affusion to be employed. The patient may, however, be advantageously sponged with tepid water or vinegar and water, or with the nitro-muriatic solution, whilst the lower limbs are covered by the bed-clothes; and this means may be frequently resorted to, especially when the heat of the body is great, and the skin dry and harsh. In many cases where disorders of the bowels supervene in the progress of continued fevers, the complication may be readily traced to the accumulation of morbid secretions having taken place in the *prima via*, and irritated the mucous surface during their retention in the large bowels. Here the method of cure is obvious: the bowels must be fully evacuated, and morbid secretions removed by those purgatives which procure full, bulky, and feculent, not watery, discharges. Watery motions always exhaust the energies of the system in the latter stages of continued fevers, and therefore those medicines which occasion them, as the purgative salts, should not be employed. The bitter aperient mixture, and others possessing, like it, a tonic as well as a purgative property, ought to be selected.

When the powers of life are considerably exhausted by the disease, or when the method of cure recommended in order to subdue increased vascular action or local determinations has lowered the patient very much, we must trust chiefly to gentle diaphoretics combined with slight restoratives, as ammonia, spiritus ætheris nitrici, camphor, &c., whilst we endeavour to restore or to improve the secretions by the use of laxatives, or purgatives combined with tonics. Even when great exhaustion is present, the necessity of removing the morbid accumulations, which are always forming in the progress of fevers, is still requisite; but we should then combine, as recommended in the foregoing section, the purgatives or laxatives with tonics; at first employing those of a gently tonic property, and afterwards resorting to the use of bark or the sulphate of quinine, as the patient may bear them, or as the signs of depression may increase.

If the patient should betray great collapse of the powers of the frame, we must then resort to the most energetic means, such as

the warm bath, followed by frictions with stimulating substances over the whole trunk and limbs, rubefacient cataplasms or blisters on the head and limbs, and stimulants and tonics internally, in any form least calculated to offend the stomach. At the same time, the large bowels may be cleared out at intervals, and their tone supported by means of decoctions of cinchona or rhubarb, or of both. When the patient complains of diarrhœa or of a dysenteric state of the bowels, these decoctions, administered in the form of enemata, are particularly serviceable, especially after accumulations of morbid secretions have been carried off by a judicious employment of purgatives or laxatives.

When the patient has not come under treatment until the stage of excitement is nearly exhausted, and the vascular action has concentrated itself in some internal viscus, the practitioner must chiefly rely upon the operation of local depletions, followed by full doses of calomel and opium, by the tepid bath, tepid sponging of the surface of the body, blisters, diaphoretics, and purgatives or laxatives. If the stage of collapse be fully formed, then we must endeavour to rally the powers of life by means of stimulants, administered both internally and externally, combined with tonics and gentle laxatives. The same kind of medicines should also be given in the form of injections, repeated from time to time according to the particular circumstances of individual cases. In cases of this description, the assiduous employment of external excitants and rubefacients is of the greatest advantage.

In the malignant or adynamic forms of continued fever, in which the powers of the system, owing either to the very predisposed state of the individual, or the powerful influence of the exciting and accessory causes of the disease, is unable to bring about reaction of the vascular system, or when the efforts at reaction are inefficient, the energies of life sinking still lower after every ineffectual struggle to restore it,—local depletions, or even a small bloodletting from the arm will often assist the powers of life to induce a moderate degree of excitement in the frame, by removing the congestion and vascular load oppressing the heart and venous trunks. But in order that such depletions should be beneficial and devoid of danger, on every occasion they should be practised with great caution, and preceded or accompanied by frictions, and the exhibition of stimulants and diaphoretics. When the energies of the frame are thus made to react, care should be observed that the reaction be not allowed to proceed too far, or to be concentrated upon some internal viscus.

When this state of excitement is imperfectly developed, the stomach, liver, and spleen, frequently betray signs of considerable disease. In cases of this kind, the stomach is always irritable, and frequent and urgent retchings, with the rejection of matters of a very morbid nature, often take place. When these symptoms are present, leeching over the region of the stomach, followed by blisters, full doses of calomel and opium, and purgative enemata, are at first requisite. If these means fail of proving beneficial, and if the colour of the face, neck, and chest, become dingy, yellow, or streaked of various shades of yellow, we should consider a malignant state of disease as having supervened, and that the retchings will soon be followed by the discharge of dark, grumous, or flaky matters from the stomach, and, perhaps, by a dark or pitchy state of the alvine evacuations. When these symptoms supervene, we must have recourse to bark combined with acids; to warm cardiacs and aromatics, with small doses of opium, in order to allay the irritability of the stomach; to the hot bath followed by frictions with stimulating substances; to rubefacient cataplasms or blisters placed over the epigastric region and insides of the thighs; and to gentle tonic and stimulating injections, to preserve the tone of the mucous surface of the large bowels. In cases of this nature, the sulphate of quinine in large doses with sulphuric acid promises to be of considerable advantage, especially in those cases in which the adynamic state of disease is chiefly owing to the continued influence of malaria upon the system, and when the powers of life require to be supported under the unremitting operation of this deleterious agent.

When the malignant or adynamic states of disease supervene either in a primary or secondary form, the necessity of resorting to the various tonic and antiseptic means within our reach is obvious. Camphor and ammonia in large doses, with the different preparations of æther, the tinctures of bark, rhubarb, and serpentaria, the tinctures of myrrh and musk, the warm spices and aromatics, &c., and various other substances of this kind, may be resorted to, according to the varying circumstances of particular cases. When the powers of life appear to sink fast, and the vomitings, if the patient's stomach be irritable, consist more of a pumping up of the contents of this viscus than of active retching,—wine, brandy or brandy and water, cider, spruce beer, brisk bottled porter, &c., in various quantities, will then be frequently of service. In addition to those means, very hot and rubefacient cataplasms should be placed over the region of the stomach and insides of the lower

limbs, and frictions with stimulating substances employed. In many instances the hot bath or the vapour-bath will precede these latter means with advantage. By these measures the powers of life will sometimes be rallied and the patient ultimately saved, if no vital organ have suffered irreparable injury during the progress of the disease. When the patient seems to be benefited by the means adopted, care should be taken that excess of action be not induced by a too liberal use of them: our aim should be to bring the pulse and state of the surface and extremities as nearly as possible to the healthy standard. When the powers of life are sinking, the pulse is generally quick, weak, and unequal, but it is sometimes slow, irregular, and remittent. The usual effect of stimulants and tonics judiciously employed, is to lower the pulse and render it more regular, or to make it more frequent and natural when it has sunk beneath the healthy standard. But we should never aim at any further effect upon the pulse than this; nor should we endeavour to produce too great a glow upon the surface by the too liberal use of stimulants administered internally; for whatever increase of action we induce above the strength of the patient, or the internal standard of the heart's action, will be supported with difficulty, and be followed by proportionate exhaustion.

On the other hand, the practitioner should not be deterred from the assiduous employment of the means now recommended in order to rouse the energies of the frame, by the failure of those remedies which he first makes use of. He should resort to others, combine them as circumstances may warrant, and increase their quantities until an effect is produced. Having thus obtained advantage, he should endeavour to retain it, and to improve it by the use of those medicines which the resulting phenomena or contingent circumstances will point out.

SECT. IV.—*On the Treatment of Febrile Attacks in the Natives of India.*

Before I enter upon the treatment of the natives, in fever, I shall premise a few observations on their mode of living, habits, and constitution, as influencing their liability to disease, and the method of treating it. The diet of the natives of India consists chiefly of rice, ghee (a kind of clarified butter), chillies or hot spices, curries, various kinds of vegetables, milk, salt fish, tamarinds; and many, particularly the Mahomedan population and the Pariahs, eat animal food. Amongst the higher classes and better-fed, who have little

labour, this diet is sufficiently nutritive and wholesome, and we generally observe these fat, sleek, clear-skinned, and healthy; while the labouring classes, and particularly the poor, are thin, weak, dry and scaly-skinned, and prone to disease. It is chiefly amongst this latter class that fevers and derangements of the digestive and assimilating organs occur.

The ranks of our native army consist of all classes and castes Rajahpoots, Mussulmans, Gentoos, Pariahs, Malabars of all castes, labourers, tillers of the ground, and artisans of all descriptions; and it is chiefly among this latter class that most sickness prevails. Disease is also often prevalent amongst the Pariahs; but this arises more from intemperance and irregularities than from any other cause. The Rajahpoots, Gentoos, and Mussulmans are the most healthy troops, generally speaking; but on active service, or for enduring fatigue, the Pariahs are equal to the Mussulmans, and the Gentoos are more efficient, and capable of bearing greater fatigue than the Rajahpoot and Malabar classes. This difference can arise from no other cause than the different modes of living which they adopt, the better fed being those most capable of enduring fatigue and exertion.

It has been generally remarked, that poor living and improper or innutritious diet amongst the natives are chiefly productive of dyspeptic complaints, accumulations of morbid matters in the alimentary canal, intestinal worms, diarrhœa, rheumatism, cutaneous affections, and other diseases of debility. But there is another source of disease prevalent amongst the sepoys, and which tends greatly to modify the character of their complaints, and consequently the treatment required to remove them. I allude to their habits of gross sensuality and intercourse with women. In order to heighten their desires, they partake of every stimulant and provocative within their reach. Those who do not drink intoxicating liquors, use opium in large quantities, and other narcotics: their unbounded sexual indulgences, and the means they take to excite their appetites, necessarily lead to exhaustion of the tone and energy of the system, and premature decay; and as venereal complaints are very common among them, it may be considered as being more or less engrafted on their constitutions, and connected with the various forms of cutaneous diseases which are so common amongst them.

As our Indian territories are now so very extensive, attention to the diseases of the natives becomes an important part of the duties which an officer proceeding to that quarter of the world is called upon to perform; and in order that he may pay it with satisfaction

to himself and to those whom he will have to treat, deference should be paid by him to their prejudices and superstitions. In the management of their diseases, we should always recollect that they cannot bear cold, and that, as soon as the signs of the vascular action are subdued, nourishment and support are indispensably requisite to their recovery, taking care at the same time to keep up a gentle action in their bowels by means of warm stomachic laxatives, and tonics combined with gentle purgatives.

The natives of India cannot bear cold or wet, and they generally suffer more in cold wet weather than Europeans; in damp, swampy countries or districts, they invariably suffer from fever, which seldom runs sufficiently high amongst the Hindoos to require venesection; though amongst the Mahomedans and the Pariah caste, this depletion is often necessary. From their habits and diet, the Hindoos have not much stamina to resist disease, and their powers of life are soon overcome by it; consequently, considerable congestion often takes place in the larger viscera, viz., the liver and spleen, while the powers of life are not sufficiently powerful to produce that action which leads to acute hepatitis; and we, therefore, seldom see abscess formed in the liver amongst them, though its functions are often impaired so as to lay the foundation for a great deal of visceral derangement, occasioning wasting of the body; dry, parched, and cold skin; diarrhœa; enlargements of the spleen; and various other diseases of debility. If these derangements are suffered to remain long without being removed, the patient often sinks suddenly, or a state of disease is produced from which they seldom or never recover, though they may linger for years.

A day, or even a few hours, will make a very great difference in the state of febrile diseases at their commencement amongst the natives; therefore, close attention on the part of the medical officer is a matter of the most serious importance. The medical officer, accustomed to treat strong and vigorous Europeans, where vascular action is generally high, is forced to observe the rapidity with which disease runs its course, and the necessity of bold and decided measures to check it. Not so, however, with the natives: in them fever often has more the appearance of debility and want of power, and would, to a common observer, or one who was a stranger to their manners and customs, appear to require cordials and tonics. But fatal consequences would result from this practice, and the disease would generally gain ground; while the patient would recover more certainly under an opposite method of cure. In the latter stages of febrile diseases, however, when the powers of life are considerably

exhausted, the use of tonic and warm cordials becomes indispensable; but great nicety of discrimination is requisite to determine when the former mode of treatment should be laid aside, and the latter adopted. The abdominal viscera, especially the alimentary canal, are chiefly liable to disease amongst the natives of India: relief, therefore, of these organs is the first consideration; and, if taken early, attacks of fever or disease in these viscera may be removed, nine times out of ten, in a few hours. An emetic I have always found beneficial, and particularly so when it acted upon the bowels as well as the stomach. I have known this to cure a severe attack of fever in twenty-four hours; but sometimes other aids are required to remove urgent symptoms, as the local application of leeches to the temples or in the neighbourhood of the liver, and the further aid of calomel and such purgatives as will remove feculent matter from the bowels, without exhausting the powers of the system by producing copious watery motions merely. It is the copious discharge of watery stools that often proves suddenly fatal to natives; and, therefore, such medicines as are likely to produce this effect are manifestly wrong. There are many occasions in fever in which general bleeding may be used with advantage amongst natives, and the belief that it should never be practised among them is an error; but with them, as well as Europeans, it requires to be employed when vascular excitement has but recently commenced, or has not continued long, and before exhaustion has supervened.

To support the powers of life in the natives, by means of tonics and cordials, must always be a great object; but while this is strictly attended to, evacuation of the alimentary canal should never be lost sight of. Accumulations of morbid matter in the large bowels, occasioned, perhaps, by a want of power in the system to relieve itself, must always be guarded against, because it keeps up that excitement, and very often occasions that watery discharge, which so soon exhausts the patient, and which is often mistaken for the disease itself, although the effects merely of fæcal accumulation and irritation. If watery motions continue without fæces, there is reason to believe they proceed from morbid and acrid matter requiring to be removed, and then they are, perhaps, an effort of nature to relieve herself from this matter.

Cold upon the natives produces shrivelled, dry, and unperspiring skin, which soon becomes scaly, and sometimes large fissures form on the feet and hands, producing a disease peculiar to natives inhabiting swampy and moist countries. With these complaints the body always wastes, and sometimes diarrhœa supervenes. The

tongue is generally, also, white and moist; sometimes white and dry; and sometimes it presents a clamminess along the edges, and a black tinge on the surface, as if ink had been spread on it. The dry white tongue generally indicates the propriety of bleeding; and the moist, white clammy, or black state of the tongue always requires purging, but the evacuations should not be watery; consequently salts are not the remedies which ought to be employed. The purgatives employed in these cases, and indeed for natives generally, ought to be always warm and stomachic. Tonics and laxatives, with alteratives, blue-pill, aloes, myrrh, rhubarb, &c., combined with ginger, will always be serviceable; yet in no instance should purgatives be given to act violently, but be employed so as to operate gently and regularly. More good is to be expected from the regularity of their operation than from their copiousness; because too copious discharges in these cases would exhaust, while moderately full and regular evacuations would strengthen the alimentary canal and the system generally.

In the intermittent and remittent types of fever occurring amongst the natives of India, we must trust chiefly to the exhibition of the bark, given during the intervals or remissions of the disease, and always in combination with cordials and warm spices. But we should at the same time attend to the state of the bowels and of the alvine secretions. A dose of calomel may be given at first at bed-time, and followed in the morning with warm stomachic purgatives, as already recommended; and the bowels should be regularly and copiously evacuated by means of the latter remedies during the exhibition of the bark, and as long as disorder remains.

In the continued type of fever, as it occurs in this class of persons, the employment of emetics and cathartics, especially during its first stage, is always of remarkable benefit. But, in order to be serviceable, these medicines should be prescribed early, generally in the first twenty-four hours of the illness, and before the acute stage, or that of excitement, is followed by exhaustion. The medicine I have found most beneficial in the commencement of continued fever, as it is observed in the natives, is six grains of the emetic tartar dissolved in a quart of water. A glassful of this solution is prescribed every five or ten minutes until full vomiting is produced, and afterwards the same dose is repeated every two or three hours. Given in this way, a full evacuation of the contents of the stomach, and subsequently copious discharges from the bowels are produced. The dose of the solution is now exhibited every five or six hours only when it acts very decidedly upon the

skin, occasioning a very copious perspiration. By these means all excitement is overcome, and the pulse and heat of skin brought down to the natural standard. After this is obtained, a gentle but regular action should be kept up in the bowels and secreting viscera, by means of warm stomachic purgatives and enemata, until the disease disappears.

When the fever assumes, as it frequently does when neglected in its first stages, either a typhoid or adynamic form, we must then have recourse to the employment of wine, cordials, tonics, and warm stomachics, and either alternate them with warm and cordial purgatives, or combine the one class of remedies with the others, according to the particular circumstances of individual cases. Bark, with ammonia, opium, hot spices, &c., is here requisite, and all the other means already mentioned when the adynamic and malignant forms of remittent and continued fevers occurring amongst Europeans were treated of.

If determinations to particular organs, or local inflammations, supervene in the progress of fevers in the native constitution, we must then, in addition to the use of purgatives, resort to local depletions: and if any internal viscus become congested, enlarged, or obstructed, similar measures must be adopted. Enlargements and obstructions in some of the abdominal viscera are very frequently observed to occur in those cases of fever which have been neglected or improperly treated at their commencement, or in those where the stage of excitement has been allowed to proceed and produce its usual effects. Enlargements of the spleen, tumours of the pancreas, enlargement of the mesenteric glands, and chronic lesions of the liver, are the most frequent effects thereby produced.

In all cases where these consequences have supervened, purgatives combined with cordials, and tonics, so as to impart energy to the digestive and assimilating functions, and keep up a constant but moderate influence upon the secreting viscera and bowels, are indispensably requisite. In some of the more robust and better fed, we may premise local depletions with advantage; but this, as well as all other measures, must depend upon the particular features of individual cases.

In the more northerly and higher provinces of India, affections of the chest, such as pneumonia, pleuritis, or bronchitis, are not unfrequent complications with fever amongst the natives, especially during the rainy and cold seasons. In cases of this kind, regular warmth, with the exhibition of diaphoretics, local or general depletions, according to the nature of the case, the use of blisters, and of

the gum ammoniacal mixture, with camphor, hyoscyamus, conium, sp. æther. nitr., and antimonials, are requisite. The bowels should also be evacuated regularly; and at the commencement of the disease an emetic may be exhibited.

If dysentery supervene in the course of fever amongst the natives, as it frequently does during the cold and rainy seasons, especially in low, damp, and swampy situations, after removing all morbid secretions and fæcal accumulations, a blister should be placed over the abdomen, Dover's powder, with calomel or blue-pill, should be given from time to time, and injections of the infusion of ipecacuanha, with warm cordials, thrown up. A flannel bandage should be wrapped round the loins and abdomen, and the patient's diet duly regulated. In the more robust, local depletions, followed by hot fomentations or poultices, may precede the foregoing measures, especially upon the first supervention of the bowel disease. When the acute symptoms have been removed by these means, we may then resort to the use of tonics combined with antacids, cordial stomachics, and warm diaphoretics: and medicines of the same kind may be employed in the form of enemata.

During the management of disease amongst the natives, care should be taken to keep them dry and warm, to avoid as much as possible all vicissitudes of temperature, and to support their strength by light nourishment. They are extremely sensible of kindness and attention to their ailments, and both should be paid them, particularly as tending to give them confidence in their medical attendant, and to secure the success of the means used for their recovery.

CHAPTER III.

ON THE MANAGEMENT OF CONVALESCENTS FROM FEVER AND DYSENTERY.

During the earlier periods of convalescence, the utmost attention should be paid to the diet and regimen of patients who have been labouring under either dysentery or fever. The food at first should be chiefly farinaceous, in small quantity, and repeated somewhat often. Care should be taken never to load the stomach; for, in the majority of cases, the mucous surface of this viscus, as well as that of the bowels, is in a very sensible and irritable condition, and liable to be thrown into a state of inflammation, inducing thereby a relapse, by whatever may excite it too strongly.

Many of the relapses which follow either febrile or dysenteric attacks depend as much upon errors in diet and regimen as upon the influence of the exhalations from the soil, and vicissitudes of temperature or of weather. After the patient has been for some time supported by farinaceous articles of diet, with the addition of a little wine, when the energies of the system require such support, the lighter and less heating kinds of meat diet may be given, at first in small quantity, and its effects carefully observed. If it heat the system or accelerate the pulse, its quantity must either be diminished, or it should be entirely omitted. The animal food which may be at first tried is that least likely to heat the system, and the readiest digested. The flesh of chickens, young fowls, and of young animals generally, is to be preferred; and soup only in small quantity indulged in, for reasons already alluded to when treating on the management of disorders of the digestive organs.

When the failing energies of the system absolutely require the supporting influence of vinous liquors, they may then be taken in small quantity; but if there exist any suspicion in the mind of the practitioner of organic disease still lurking about the system, they should never be ventured upon. They are beneficial chiefly when employed to excite the exhausted energies of the frame, when exhaustion as supervened as a consequence merely of over-excitement,

and when it is quite unaccompanied with congestion or lesion of any particular organ. If we find any acceleration of pulse or heat of skin follow either the food or wine indulged in, we should immediately resort to purgatives and a stricter antiphlogistic diet. Relapses both in fevers and in dysenteries are chiefly occasioned by a too liberal indulgence of the returning appetite, together with want of a sufficient attention to the state of the bowels, and to the use of purgatives or laxatives, as circumstances require. Undue exposure, also, either to the sun, or to the night-air and dews, or a too sudden return to the habits and regimen usually followed by the patient in health, frequently occasions relapses. But one of the frequent causes of such occurrences, especially when acting conjointly with those now enumerated, is the continued operation of the exciting causes of fever and dysentery, namely, exhalations from the soil, during the progress of recovery.

This cause should be especially guarded against, both during the continuance of disease and the commencement of recovery, and the patient, if possible, removed beyond its reach, to more salubrious situations. When the distance to a more healthy situation is short, patients should be taken thither immediately upon their being taken ill: if the place be too far for immediate removal, they should be taken to it as soon as their state admits of the change; for it is often surprising to see the great rapidity of recovery in a salubrious situation, compared with what is always observed in localities abounding with the sources of disease, or in which disease is endemic. During my practice in India I have had numerous instances of these facts brought to my notice. Thus, in Java, during the expedition to that place in 1811, when in charge of the chief hospital at Weltivreeden, I remarked the very great malignancy and mortality of fever and dysentery in the hospitals of Batavia, and the entrenched camp at Cornelis, and the long duration and difficulty of recovery: whilst deaths were much fewer, and convalescence much more rapid, in the more elevated and better ventilated hospital at Weltivreeden, which was but a short distance from these very pestilential situations. In them disease of every kind, owing to the continued operation of a most noxious atmosphere, was rendered more malignant; and all disorders, whether external or internal, were stamped with the same general character. In the higher and more healthy positions to which the sick were afterwards taken, disease ran its course, in various forms, according to the circumstances of individual cases, assumed a more manageable character, and was followed by a more rapid and perfect recovery. But in

other situations, as where the troops cannot be taken to a healthy situation, immediately upon being seized by disease, the period of convalescence must be waited for, when great advantage will generally be obtained by removing them to healthy localities until they are perfectly restored. The advantages which result from carrying men at first when taken ill, or as early as convalescence will admit, to salubrious situations, for the purpose of medical treatment, and removal from the powerful causes of disease to which the neglect of such a measure might expose them, are evident not only in the occurrence of a milder or less dangerous form of disease, and a more rapid convalescence, but also in the preventing of those local congestions and fatal obstructions of internal viscera from supervening, which ultimately either prove fatal, or oblige those affected by them to leave the country.

Having thus insisted upon the propriety of taking the sick at once to hospitals or other accommodations placed beyond the sphere of operation of those causes which occasioned the disease, and particularly without the influence of the endemic source of mischief; and, if this be not practicable, of removing them, when convalescent, to such situations, observing at the same time all due precaution, both during the removal and after it has been made,—I shall offer a few remarks upon the propriety of attending closely to the state of the functions of the digestive organs, to the diet, the regimen, and the dress, for a considerable time after convalescence from fevers and dysentery, and especially when the patient is returning from India to Europe.

Attention to the actions of the stomach is important; they may be promoted by gentle tonics; but the use of these medicines should also be combined with laxatives, as the employment of the former merely, during recovery from febrile diseases, is always productive of constipation; and the functions of the bowels, as well as those of the stomach generally, require assistance for some time after all other derangements are removed. In those cases, where any of the abdominal viscera have suffered considerably during the dysenteric or febrile disorder,—and these are very numerous,—the combined operation of gentle laxatives and deobstruents with tonics is extremely necessary. Where the colon, liver, or spleen, have experienced any organic lesion, which is frequently the case, and where there is reason to believe that enlargements, obstructions, or other similar derangements, still remain, the use of purgatives and laxatives, with gentle tonics, change of air, and other internal and external remedies, and measures which I have already noticed as

requisite in chronic diseases of the organs employed in the functions of digestion and assimilation, should be put in practice.

These means, with a strict attention to clothing, should be also resorted to when the patient finds it necessary to remove from India, or any other intertropical country, to Europe. During the voyage homewards, invalids generally find it a matter of great difficulty to keep the bowels sufficiently open; and many have their complaints aggravated by want of attention to the functions of these viscera. Accumulations not unfrequently thus form in the large bowels, and occasion irritation; and if the patient have been suffering from dysenteric disease, a return of his disorder is not an unusual consequence. In other cases, where the liver has been much affected either from previous disease, or during fevers or dysentery, an attack of hepatitis may be induced by the want of due attention to the state of the bowels, conjoined with the influence of a colder atmosphere than that to which the patient had been for some time accustomed.

Attention to warm clothing, when returning to a cold climate, has been already insisted upon, when the disorders of the liver and stomach were under consideration. But although requisite in these, it is still more so in derangements of the bowels, and especially when the patient is returning to Europe in order to restore his health, after attacks of dysentery or fever. He should never dispense with flannel next his skin, on any occasion, and should be particularly careful always to preserve his feet warm, and resort to such other additional clothing as his sensations and the varying state of the seasons in Europe require. When he has returned to England, he should be still more careful both to preserve an open state of his bowels, and to keep the surface of the body and extremities comfortably warm.

When the patient has it in his power to select the period of return to this country, some attention may be paid to it. If he arrive early in the spring, he is liable to feel the effects of a very variable season for some time. If he returns in winter, the sudden transition from a warm climate to a cold one may be detrimental to the system, especially after it has become assimilated, by a long residence, to a warm country. In my opinion, the best time of arriving in England is in the months of June, July, August, and September. If the invalid find the cold too severe during the winter months in some of the more easterly counties or in the metropolis, he may try the climate of Bath, and make use of the waters, which may be of service to him.

He should, at all times, be attentive to the first symptoms of disorder, especially of his bowels, and immediately resort to medical aid. He should also never neglect the slightest cold; for persons who have resided for any considerable time in a warm climate, are liable to pulmonary affections, and inflammatory attacks implicating both the liver and lungs, upon their arrival in Europe. Those who have suffered much from ague should also be cautious of exposing themselves to its causes when they arrive in this country; for a liability to attacks of this form of fever often continues through the greatest part of life, especially if the patient be subjected to their exciting causes in a state of predisposition to their invasion. In other respects, the invalid who is returning to Europe after attacks of dysentery or fever, should adhere to the injunctions insisted upon in the former part of this work, and there urged in respect of change of climate after diseases of the stomach and liver.

CHAPTER IV.

ON THE MANAGEMENT OF EUROPEAN TROOPS UPON THEIR ARRIVAL IN INDIA, AND DURING THEIR RESIDENCE IN THAT COUNTRY.

THE diseases to which European soldiers are liable on their arrival in India, may be considered as the natural consequences of a sudden change into a country essentially different in many respects to that in which they have been born and reared. They are at once brought into a higher temperature, and breathe an atmosphere loaded with moisture and exhalations from the soil, added to which, their whole system of living is changed. That general derangement of health should follow upon such changes must be evident, and this appears either in the form of fever, dysentery, or other diseases, according to the habit and temperament of the individuals and often continues until the system becomes more assimilated to the climate or until habits are acquired more congenial to their new position and better adapted to the country; for although an intertropical climate often proves uncongenial to the European constitution, I am satisfied that much depends upon the change of habit, diet, and imprudence of soldiers upon their arrival in Indi; and it is to these points that I wish to direct attention.

The soldier in England, whether in barracks or in quarters, has always a good bed, his food is plain and good, and he has also malt liquor. On his embarkation for India a great change takes place both in his habits and mode of life: he is put upon salt provisions, *i. e.* salt beef and pork, with flour and peas; and in place of malt liquor he has a daily allowance of *half a pint of rum*, either in a diluted or an undiluted form, according to the discretion of the commanding officer: he has, however, a good hammock and bed during the voyage. The troops are generally made to keep watch whilst on the passage to India; and they are divided for this purpose into three divisions, so that one-third are necessarily upon deck. This gives more room to the men who are not on duty. But when they get into a hot climate, they prefer being upon deck both day and night, which though not allowed, is difficult to be prevented, for

the heat and closeness of the decks below are so great, that the men come up at night exceedingly heated, and expose themselves to the damp, cold night air; thus creating a predisposition to disease, and frequently occasioning serious derangement of health, although these may not be evident at the time or till after landing in India, where a more efficient cause produces a rapid development of that disorder which probably commenced upon the voyage. Soldiers and recruits on their arrival in India, unthinkingly expose themselves to the sun during the hottest part of the day, and indulge in various excesses, eat fruit of all kinds, ripe and unripe, and every trash which is procurable for little or nothing in every bazaar in India. The period of sending troops to India, it must also be observed, is not well chosen: they generally arrive between the months of May and August, of all others the most unfavourable season for landing troops,—May, June, and July being the hottest months in the year at Madras, and the rainy season in Bengal and Bombay.

Exemption from disease is commensurate with a due attention to clothing and diet, according to seasons and vicissitudes of weather; and neglect of them must necessarily lead to the development of disorders which might be prevented by better arrangements. As garrison surgeon of Fort St. George and in charge of the general hospital at that presidency, from 1819 to 1824, my duties made me intimately acquainted with every circumstance connected with the health of troops on their first arrival in the country, and I had ample opportunites of observing the working of the system then in use, the bad effects of which I had frequent occasion to bring under the consideration of the local authorities; but although the inconveniences complained of were corrected at the time, no permanent change was made till 1830-31. Prior to this period men landed with what is called their *kit* only, the bedding and blankets being generally left on board ship, under the impression that such articles are not required in a warm climate. The great coats were also taken from them and placed into store, probably under the same view, and on the arrival of the soldier at his barracks, a wooden cot with a bamboo mat was provided for him, but neither bedding or covering of any kind beyond the clothes he wore.

On my return to England on furlough in 1825, after a service in India of twenty-five years, I had the honour of making the acquaintance of Sir James M'Grigor, with whose zealous labours in the advancement of medical science, and general improvement of the army medical department, I was already familiar. To him I mentioned many of the circumstances here stated, and, through him,

I had an opportunity of communicating with some of the medical officers then about to proceed to India as deputy inspectors-general of his majesty's hospitals in that country, a new appointment made about that time; and, in furtherance of this great object, and with a view of bringing this important subject more directly to notice, I expressly devoted a chapter to it in the previous edition of this work published in 1828, and had several copies separately struck off, which I had the honour of submitting to his late majesty, William IV., to his grace the Duke of Wellington, to Lord Hill, to Sir Herbert Taylor, to the adjutant and quarter-master-general of the army, and to the Directors of the Hon. East India Company, &c. In 1829, the honourable the court of directors, addressed a letter to their governments in India, directing arrangements to be made with reference to the landing of troops in India, and the care of them during their passage. These regulations have been acted upon since June 1830, and there can be no doubt have already been attended by beneficial results; for it appears from the medical returns of the Madras army from 1793 to 1837, that mortality has decreased nearly one half in the last eight or ten years.*

The diet of soldiers in India is not an unfrequent cause of disease, and being so different from that to which they have been accustomed both in England and on their passage to India, it is highly deserving of attention. The messes into which the companies of a regiment are divided, are not always sufficiently attended to by the officers, and the modes of cookery adopted are liable to numerous objections. Men will often indeed be found rather to abstain altogether from the animal food allowed, than partake of it in the form of curries, stews, &c. Nor is the quality of the food always sufficiently attended to by those who are generally entrusted with these interior regimental arrangements; and this accounts for the variety often observable at the same station and under similar circumstances in different regiments as regards the healthiness of corps, one being very sickly, whilst another shall be remarkable for its immunity from disease. Thus good regimental arrangements, the quality of food and the mode of dressing it, are all points of such importance as regards the health of regiments, that too much attention cannot be paid to them by officers commanding European troops. Men who have families generally fare better; they are excused from messing with their companies, and permitted to live

* See Quarterly Journal of the Statistical Society of London, for July 1840, page 122.

with their families; their food is therefore dressed according to their inclination, and when sober and orderly, they are comparatively healthy.

The breakfast is a meal to which I think there is not sufficient attention paid, although one of real importance as regards the health of the troops; indeed, I consider it of so much consequence that I recommend, in the strongest manner, that a well-regulated breakfast mess should be established in every regiment in India, and that it should be as much under the cognisance of the officer of the day and the commanding officer as the dinner mess now is.

Although the health of a regiment depends very much upon good interior regimental arrangements in barracks, wholesome food, and comfortable bedding and clothing, I am, nevertheless, of opinion that much depends upon the soldier himself, as it will be seen in all regiments that the largest proportion of sick and mortality will always be found among that class of men who are most irregular in their habits and indulge most in excesses. Officers, cadets, and civilians do not, in general, suffer from disease in the same degree as soldiers, though, from age and other causes, they are equally liable to the influence of climate. This partial exemption from disease I apprehend to arise from their being better fed, not given to intoxication, less exposed and more comfortably lodged; and, if this view be correct, it follows, that similar attention paid to the soldier, would be attended with equally beneficial results.

The system of issuing raw spirits to the soldier is the basis of all disorderly conduct in regiments, and contributes more towards the production of disease and death than any other cause I am acquainted with, and until this system is abolished, it will be quite impossible to regulate the habits of soldiers in India.* Temperance societies, doubtless, may have their advantages among a certain class; but I fear they will reform only a very small proportion of a regiment, and in many instances, I believe the change is merely temporary, particularly among the old soldiers, who have been so long accustomed to drink spirit that they cannot easily overcome the bad habit: with young recruits it may be more successful if judiciously managed; for it is not all recruits that are fond of spirits. I have known instances of recruits not drinking their drams for months after their arrival in India, and they generally sell them to the soldiers' wives, who make a profitable trade in the sale

* Since the above was written, I have been much gratified to learn at the East India House that this practice has been abandoned, and that the men are allowed money in lieu of the spirit.

of spirits in barracks, which is another fruitful source of irregularity and drunkenness in regiments, and though not sanctioned by the authorities, is nevertheless practised very generally.

After every pay-day, the sick list is increased from irregularity and intemperance. Relieving corps, and arrival at new stations is generally attended with similar consequences; but one of the greatest evils we have to contend with is the large balances due to men discharged from hospital which tends more to the loss of European life in India than perhaps any single cause; this is a fact well known, and has frequently attracted the attention of government and the military authorities, and various ineffectual efforts have been made to prevent it; the subject is one of great importance to the efficiency of the army, and highly deserving of particular notice.

The balance coming to a soldier in barracks at the end of each month, after paying for his messing and all other necessary expenses, is as follows:—viz. a man of the first class receives a balance at the end of the month of three rupees twelve annas, or in English money 6*s*. 10*d*. A man of the third class receives a balance of one rupee nine annas, or 1*s*. 11*d*.; but the balance due to a soldier who has been one month in hospital, is, for the first class, nine rupees five annas, or 13*s*. 11½; and for the third class seven rupees two annas or 10*s*. 2*d*.; now as these large balances are appropriated to the very worst possible purpose, namely, drunkenness, it is obvious that any measure that would cause a reduction of them would not only be desirable but would be attended with great public good.* The daily issue of the balance of the soldier's pay as now in force, and the increased expense of a convalescent mess which has been recommended and tried, has not been found to answer the purpose expected; without entering therefore into the discussion of the merits or demerits of these regulations, I shall merely observe that in my opinion, to increase the stoppage from the pay of the soldier while in hospital would be the least difficult, and certainly the most effectual mode of obviating the evil complained of.

According to the present system in India, every sick European soldier received into hospital is provided with diet, clothes, bedding, wine, medicines, and whatever else he may require or his medical attendant may think necessary for him at the expense of the Indian

* The pay of the soldier has been, I believe, lately increased, and the amounts therefore stated above may not be literally correct. I have named the sum as it was during my residence in India; if it has since been increased the observations made will apply with still greater force.

government, a small stoppage being made from his pay of two annas and a half, or 3½*d. per diem*. The regulations observed in Her Majesty's service in England and in the Colonies authorises a stoppage of 10*d. per diem*, from the pay of every soldier in hospital to meet the expenses of diet, clothing, and all necessary charges; it appears to me, therefore, quite fair that the same principle should be adopted in India; and that 10*d*. and not 3½*d*. should in future be the stoppage from the soldier's pay. I see no possible difficulty in the measure, as it is only adopting Her Majesty's regulations, which, in fact, are followed in almost every instance in India, with the single exception of hospital stoppages. The additional stoppage may be carried to the government in diminution of the hospital expenses; or it may be formed into a regimental fund for the benefit of the families of the soldiers, when they require extra assistance to supply them with many essentials required on the march of a regiment which are not provided for by the regulations of the service.

The importance of good bedding and clothing, as contributing to the health of men in all situations, has already been dwelt upon in the "Preliminary Observations" to this work, and in the chapter on "Diet and Regimen, &c.," and there can be no doubt that whatever tends to a soldier's comfort will add to his efficiency. At the same time it is proper that these points should be regulated with a view to preserve a uniformity of system both in garrison and in the field, particularly in India, where the soldier is so suddenly called into active service. I shall, therefore, confine my observations to what I conceive will be practically useful both in barracks and in the field, and as a permanent arrangement for the soldier while he continues in India.

A *numbda bed*, and a kiar pillow covered with chintz, with a good blanket, should be provided for every soldier and recruit on his first arrival in India, and this should be a barrack store at the presidency, where all recruits land, to be transferred from one regiment to another, or from one set of recruits to another, as the case may be, but not removable, the equipment for marching being otherwise provided for as follows:—Each soldier and recruit, previous to marching to join his corps, should be provided with two flannel shirts, a waist-belt, sufficiently broad to embrace all the soft parts between the hips and ribs; a blanket and a good setringee, or country carpet, to answer the purpose of a bed, and this should be the established regimental equipment for every soldier, to be kept up at his own expense, after the first issue, by which arrangement the soldier would always have the advantage of good bedding

and good clothing, in all situations and under all circumstances, whether in the field or in garrison—a measure of the very first importance as regards the efficiency of all regiments; for, I believe that the constitution of the soldier is very materially impaired from the want of these essentials in the early period of his service in India.

In the course of my service, I have remarked that good and well-conducted soldiers, who have been a sufficient time in India, to enable them to purchase good country carpets, and other personal conveniences, have always excellent beds in barracks, and also in the field; and as their efficiency is generally proportioned to their possession of these essential comforts, it would be desirable, in my opinion to render every soldier equally efficient. The arrangement I propose will, I conceive, have this effect, and, with proper attention on the part of the officers, the careless and indifferent soldier would be made as efficient as those better disposed. The first outlay for such an arrangement would, doubtless, be very considerable; but, when compared with the saving of human life, and the efficiency of the army, it will prove a judicious expenditure, and, perhaps, an ultimate saving to the government. I understand something of this kind is adopted in Bombay, and that an allowance of four rupees per man *per annum*, is allowed for this purpose. If a similar arrangement were made in the Madras presidency, 36,000 or 40,000 rupees per annum, would cover the whole expense, and, by making commanding officers responsible for the efficiency of their regiments under all circumstances, there can be no doubt it would prove an admirable measure and a great public saving.

With regard to the age best suited to meet all the vicissitudes of an intertropical climate, I presume there can be but one opinion amongst those who have given the subject consideration, namely, that the soldier should be master of all his powers, and in the full strength and vigour of life. No weakly or sickly men should ever be sent to India; they are unable from the first to perform their common duties, or to bear the fatigue of drills. They become idle, useless, dissipated, and troublesome characters, acquiring all the vices of the barrack, setting bad examples to better men, who are not unfrequently misled by such characters, and they often destroy the efficiency of a corps.

That many unfit persons are very often sent to India as recruits of all ages from fifteen to forty and upwards, and that it must cause considerable loss to the Indian government, cannot be questioned. I have noticed this in my "Sketches of the Diseases of India,"

and shall, therefore, not farther refer to the subject. My present object is to point out what appears essential to the efficiency of the army, the better condition of the soldier, and the preservation of human life. It would be desirable that every recruit who goes to India should be master of all his exercises, and perfect in all his duties, so as to render his exercise on his first arrival rather salutary than fatiguing as it now is. The drill absolutely necessary to make a soldier, is often in India too much for his strength, and causes exhaustion. These drills would be practised in England with more impunity than in India, except an establishment was formed for the purpose on the Neilgherry hills, where men could be exercised as well as in England. I feel confident that such an establishment, judiciously conducted, would be the means of preserving many valuable lives who now fall a sacrifice to drilling before they can be properly qualified for duty.

Regiments, on their first arrival in India, often suffer from excessive drilling in the heat of the morning: they are generally out between four and five o'clock, and return between seven and eight. The sun, at this time of the day, is exceedingly oppressive, and men frequently fall down in the ranks, and are taken to the hospital. I conceive that no regiment should be out in the Carnatic after half-past six o'clock or seven at the farthest, and that the drills might probably be more safely performed in the evening; but this is a point upon which I will not dwell beyond stating what I consider to be right upon general principles, which must be modified according to circumstances. For instance, in the Carnatic, which is very hot, early hours would be advisable; while in Mysore, Hyderabad, and the Ceded Districts, where there are heavy fogs and dews, which are not dissipated before nine or ten o'clock, or, perhaps, later, the troops should not be taken out till a more advanced period of the day.

The morning marches for exercise, I consider as extremely useful; they enliven the soldier without producing exhaustion. In respect to marching regiments or detachments, the object is to proceed sufficiently early in the morning to get them under cover before the sun becomes oppressive, at the same time not too early to deprive the men of their usual and natural rest. This requires great attention on the part of the officers in command; for it is a very common practice in India, both with European and native soldiers, to pass the best part of the night before a march in sending off their families, by which they are deprived of rest, and are frequently in a state of exhaustion before they start on the march in the morning. This I

have often witnessed; and as it is a source of much distress, I feel anxious, if possible, to prevent it, by pointing out the evil; but it will require the best exertions of every officer in the regiment to do so. It would conduce much to health, if a general regimental arrangement were made to give every man a cup of tea or coffee, or warm congee-water with a chilly in it, before he sets out upon his march in the morning—it would enable him to go through the march of any distance with more comfort, and to perform his duties after arrival at his ground with more ease and satisfaction. Night marches should always be avoided, if possible—chiefly on account of depriving men of rest, which cannot always be made up for after fatigue during the heat of the day. The distance of a march is also deserving attention—as unnecessary fatigue should always be avoided when it can be done without injury to the service. The regulations of the service limit the march of troops on common occasions to an average rate of nine miles per day—but this is seldom attended to, and the marches are far more frequently fourteen, sixteen, and sometimes eighteen miles, which in India is distressing and fatiguing to troops, and should never be insisted upon except under pressing circumstances. I am aware that long marches sometimes depend upon unavoidable circumstances, such as the want of water in particular seasons, and in particular districts, which cannot be obviated; but it sometimes happens that they are occasioned by imperfect information of the country through which troops pass: in such cases, perhaps, it would be judicious to give commanding officers discretionary power, in conjunction with the civil authorities who regulate the supply of provisions, &c., to divide these marches into two, thus making the march eight or nine miles in place of sixteen or eighteen. An arrangement of this kind would very much add to the convenience of the soldier and render the cattle more efficient—a subject of much importance in marching troops in India. They would thus be enabled to proceed at the rate of eight or ten miles a day with fewer, or perhaps no halts at all, and arrive at the end of the march perfectly fresh and fit for any exertion. It often happens that after a very long march, perhaps of some hundred miles, troops may be suddenly and unexpectedly called into active operations; and it is obviously an object of no small importance to the public service that the troops and cattle should be in a condition to meet such exigencies.

When the mind is excited by any unusual pursuits, disease is resisted for a time under all difficulties and hardships; and when the novelty which causes this exciteement has passed, and despondence

and disappointment succeed, the frame soon feels the effect of climate, especially where there is any predisposition to disease, which is no uncommon circumstance after a long voyage. Soldiers and recruits, soon after their arrival in India, are often thus circumstanced.

During the period I had charge of the General Hospital at Madras (five years), I had every opportunity of observing the state of men after a voyage, and the state of predisposition in which they usually arrive in the country. In all cases, whether soldiers or sailors, in addition to a state of great vascular plethora and irritability of fibre, the morbid accumulations which had formed in the large bowels were so considerable, as actually to require medical discipline for weeks to restore them to healthy action. This is a circumstance of much practical importance, and points out what should be done upon the voyage to, and on arrival in India, both as regards the health of the soldier, and the treatment of his disease.

From the nature of the predisposing and exciting causes of disease, and the habits and constitution of recruits, and other newly arrived Europeans, it will appear that, in the majority of cases, great vascular action is more likely to occur amongst them than in the soldier seasoned by a few years' residence in the climate. With such a tendency, therefore, the extreme impropriety of teaching the young soldier to drink a certain quantity of ardent spirits upon an empty stomach every morning, needs no comment. To prevent or to diminish this high state of vascular action in the management of young European soldiers recently arrived in India, is a very important indication, and should be always held in view, not only by medical men, but by officers commanding regiments; for, by paying an early attention to the detection of disease it will be either immediately arrested in its progress, or brought to a favourable issue before the first symptoms of irritation have passed into inflammation, and consequent organic lesion. This, however, is a subject too little attended to by the soldier or the medical officer, and it is one of so much importance to the efficiency and healthy condition of a regiment, that I cannot urge in too strong terms the necessity of encouraging men to make their complaints known on the first invasion of disease; and that the custom of designating men skulkers, who complain upon slight ailments, should be reprobated by every person in authority, or who has the command of soldiers. Attention on the first appearance of disorder, and encouraging them to make their ailments immediately known, may be the means of saving many valuable lives; for it too frequently happens, that good men,

from the fear of being considered skulkers, do not apply for assistance until necessity obliges them, and at a time, perhaps, when all medical aid is useless.

Amongst new arrivals in warm climates, almost every disease commences with slight affections of the bowels; and although these symptoms should be immediately attended to, they are too often neglected. The soldier, being aware of his own irregularities, avoids bringing his case to notice, fearing the reproaches that generally follow, and which, on this account, should be studiously avoided, not only by medical, but by regimental officers also, as reproaches prevent him from applying for medical aid at the commencement of these disorders, when a very little care might remove them. It should never be forgotten, that both soldiers and sailors, in all matters that concern their health and welfare, are perfectly children, and should be treated accordingly. Skulking and shamming disorders may not always, be easily detected; but it is better that the surgeon should be imposed upon than that the soldier should lose his life; and I cannot too strongly urge attention to this branch of regimental medical discipline.

When treating of the management of convalescence from fevers and dysentery I took occasion to remark upon the necessity of removing convalescents from those stations or localities which contained the exciting causes of disease, either within themselves or in their vicinity. The importance of this step is shown, not only in preventing relapses and in promoting a more speedy recovery, but also in the prevention of many diseases of the abdominal viscera which are not usually referred to locality for their origin. The same injunction which was urged in respect of convalescents holds with regard to men in the enjoyment of health. When owing either to occasional occurrences, or to the vicinity of the sources of malaria, a station or place becomes unhealthy, if these causes cannot be removed or greatly mitigated, the necessity of transferring troops to other and more healthy stations is evident. If the unhealthy places must be retained, no more men than are sufficient for the purpose should be doomed to the duty; and if the immediate vicinity offers any situation more healthy, an encampment may be there formed, and a temporary hospital erected for the purpose of receiving those suffering under diseases, in order that they may be removed as far as possible from the continued and baneful operation of its causes, and there treated under circumstances favourable to recovery.

In India, as healthy situations are generally selected for Euro-

pean troops as circumstances will permit, and the objections which may be forcibly urged against many military stations in the West India Islands, have comparatively less ground in the eastern hemisphere; yet still the subject is one of great importance, and deserving attention from the Government and the local authorities. The recollection that ten times as many men perish from disease in warm climates as from war, even in time of war, should render the choice of salubrious military stations, and the removal of troops from unwholesome to healthy places, whether the causes of disease be contingent or permanent, subjects of the very first importance. Some stations are always more unhealthy than others, particularly at certain seasons of the year. These should be partly or altogether relinquished, in favour of such as are more salubrious, if the causes of disease are of that nature which cannot be remedied: if they admit of remedy or mitigation, the attempt should be made; and when disease appears in consequence of contingent circumstances and events, measures calculated to meet the emergency should be resorted to.

The preceding observations it will be seen are particularly confined to the treatment of troops upon their arrival in India, and the preservation of their health in barracks. The internal general arrangements for the sick in the Madras Presidency are as perfect as they well can be; the construction and size of the buildings, however, would admit of much improvement. This subject has already undergone considerable discussion among the authorities in India, and it is therefore unnecessary to consider it in this place, for, although in possession of ample materials, it would not, perhaps, be quite in accordance with the objects and plan pursued in the present work. I must, however, be permitted to observe, that in no country is more attention or kindness paid to the sick than in India, nor is there a public service in the world more efficiently or more liberally supplied with every essential to carry on the public service of the country, or to meet every claim upon humanity than that of the East India Company; and whenever there is any want, it is to be imputed to the local executives, and not to the authorities either in India or in England, and it only requires a proper representation at any time to be supplied with whatever may be needful without reference either to expense or trouble; and this I have always found to be the case through a service of thirty-seven years.

In conclusion, I am desirous of adverting to a circumstance which I have reason to believe constitutes a prolific source of disease

among troops on field service; and, although I am conscious of the great difficulty of applying a remedy to it, I cannot but urge the necessity of its consideration.

In actual service in India it is not unusual that the ground upon which troops encamp is marshy and sometimes completely covered with water,—a circumstancenot to be avoided, inasmuch as it depends upon the nature of the country and the seasons in which warlike operations are carried on; so that the soldier, after a long and fatiguing march, is sometimes necessarily exposed to all the inconveniences of sleeping upon damp beds and in damp clothes during the greater part of, or perhaps the whole period of, the time in which he may be employed in the field. That this must prove a fertile source of disease among troops in the field cannot be doubted; and it would be an object, therefore, of the very first importance, if any plan could be devised to secure for the soldier, under such circumstances, a dry bed. Officers sleep on cots placed about two feet from the ground, which, in some measure, protects them from the damp; but they are equally exposed in every other respect. Straw is sometimes furnished to the men, but it is seldom found in sufficient quantity to supply bedding for soldiers in addition to forage for cattle. Various suggestions have been made,—such as the employment of oil-skin cases, india-rubber air-beds, &c.; but I fear that, unless something could be contrived in the shape of a cot, and raised a sufficient height above the ground, all other efforts must be useless. I am quite aware of the great difficulty of recommending any general system: much depends upon local circumstances, and much also upon the energy and activity of commanding-officers—at the same time, I have no doubt, that effectual aid in this matter might be given to the commanding-officer by the government; and it is on this account I have ventured to allude to the subject. Although efficient arrangements may be attended with considerable expense, great advantage would result from them; and my object in stating the circumstance proceeds from a desire to notice every thing which appears important in relation to the preservation of the health and comfort of the troops, and consequently to the greater efficiency of the army.

THE END.

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ERRATA.

Page 54, line 6,—*for* "Seeduvaghun" *read* "Seedashevaghur or Seedasaghur."
Page 59, line 35,—*for* "Pallam" *read* "Pallaur."
Page 68, line 5,—*for* "31¾ miles" *read* "3¾ miles."
Page 73, line 6,—*for* "Amaraiti" *read* "Amaravittee."
Page 77, line 3,—*for* "wood" *read* "road."
Page 78, line 8,—*for* "the" *read* "these."
———, line 21, *for* "Ootalmund" *read* "Ootacamund."
Page 123, line 37, *for* "to" *read* "at."
Page 137, line 36, *for* "forwards" *read* "forward."